Artisan Technology Group

Artisan Technology Group is your source for quality new and certified-used/pre-owned equipment

- FAST SHIPPING AND DELIVERY
- TENS OF THOUSANDS OF IN-STOCK ITEMS
- EQUIPMENT DEMOS
- HUNDREDS OF MANUFACTURERS SUPPORTED
- LEASING/MONTHLY RENTALS
- ITAR CERTIFIED SECURE ASSET SOLUTIONS

SERVICE CENTER REPAIRS
Experienced engineers and technicians on staff at our full-service, in-house repair center

WE BUY USED EQUIPMENT
Sell your excess, underutilized, and idle used equipment
We also offer credit for buy-backs and trade-ins
www.artisantg.com/WeBuyEquipment ↗

InstraView™ **REMOTE INSPECTION**
Remotely inspect equipment before purchasing with our interactive website at ***www.instraview.com*** ↗

LOOKING FOR MORE INFORMATION?
Visit us on the web at ***www.artisantg.com*** ↗ for more information on price quotations, drivers, technical specifications, manuals, and documentation

Contact us: (888) 88-SOURCE | sales@artisantg.com | www.artisantg.com

TS/HW_Title Page ix Tuesday, May 7, 1996 3:27 PM

TurboStack™

AT-TS06F/ST, SC, SM
AT-TS08
AT-TS12F/ST, SC, SM
AT-TS12T
AT-TS12TR
AT-TS24T
AT-TS24TR

Ethernet Hubs
with Management

Installation Manual

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

© Copyright 1996 Allied Telesyn International
All rights reserved. No part of this publication may be reproduced without prior written permission from Allied Telesyn International.

Allied Telesyn International reserves the right to make changes in specifications and other information contained in this document without prior written notice. The information provided herein is subject to change without notice. In no event shall Allied Telesyn International be liable for any incidental, special, indirect, or consequential damages whatsoever, including but not limited to lost profits, arising out of or related to this manual or the information contained herein, even if Allied Telesyn International has been advised of, known, or should have known, the possibility of such damages.

Ethernet is a registered trademark of Xerox Corporation. UNIX is a registered trademark of UNIX System Laboratories. Novell and NetWare are registered trademarks of Novell, Inc. Microsoft and MS-DOS are registered trademarks and LAN Manager and Windows for Workgroups are trademarks of Microsoft Corporation. 3Com is a registered trademark of 3Com. PC-NFS is a trademark of Sun Microsystems, Inc. PC/TCP is a registered trademark of FTP Software, Inc. DECnet is a registered trademark of Digital Equipment Corporation.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Electrical Safety and Installation Requirements

RADIATED ENERGY

U.S. Federal Communications
Note: This equipment has been tested and found to comply with the limits for a Class A digital device pursuant to Part 15 of FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with this instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Note: Modifications or changes not expressly approved by the manufacturer or the FCC, can void your right to operate this equipment.

Canadian Department of Communications
This Class A digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique de la classe A respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

STANDARDS: This product meets the following standards

RFI Emission EN55022 Class A

WARNING: In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

Immunity EN50082-1

Electrical Safety EN60950, UL1950, CSA 950

This is a "CLASS 1 LED PRODUCT"

SAFETY

ELECTRICAL NOTICES
WARNING: ELECTRIC SHOCK HAZARD
To prevent ELECTRIC shock, do not remove cover. No user-serviceable parts inside. This unit contains HAZARDOUS VOLTAGES and should only be opened by a trained and qualified technician. To avoid the possibility of ELECTRIC SHOCK, disconnect electric power to the product before connecting or disconnecting the LAN cables.

LIGHTNING DANGER
DANGER: DO NOT WORK on equipment or CABLES during periods of LIGHTNING ACTIVITY.

CAUTION: POWER CORD IS USED AS A DISCONNECTION DEVICE. TO DE-ENERGISE EQUIPMENT, disconnect the power cord.

INSTALLATION
ELECTRICAL—AUTO VOLTAGE ADJUSTMENT
This product will automatically adjust to any voltage between the ranges shown on the label.

ELECTRICAL—TYPE CLASS 1 EQUIPMENT
THIS EQUIPMENT MUST BE EARTHED. Power plug must be connected to a properly wired earth ground socket outlet. An improperly wired socket outlet could place hazardous voltages on accessible metal parts.

ELECTRICAL—CORD NOTICE
Use power cord, maximum 4.5 meters long, rated 6 amp minimum, 250V, made of HAR cordage molded IEC 320 connector on one end and on the other end a plug approved by the country of end use.

MOUNTING INSTRUCTIONS

CAUTION: These models are designed for operation in the HORIZONTAL position. VERTICAL MOUNTING must not be done without the use of an Allied Telesyn vertical mount chassis designed for this purpose.

CAUTION: Air vents must not be blocked and must have free access to the room ambient air for cooling.

CAUTION: DO NOT detach rubber feet from the product unless an Allied Telesyn vertical mounting chassis is being used.

OPERATING TEMPERATURE
This product is designed for a maximum ambient temperature of 40° C.

ALL COUNTRIES: Install product in accordance with local and National Electrical Codes.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

NORMEN: Dieses Produkt erfüllt die Anforderungen der nachfolgenden Normen.

Hochfrequenzstörung EN55022 Klasse A

WARNUNG: Bei Verwendung zu Hause kann dieses Produkt Funkstörungen hervorrufen. In diesem Fall müßte der Anwender angemessene Gegenmaßnahmen ergreifen.

Störsicherheit EN50082-1

Elektrische Sicherheit EN60950, UL1950, CSA 950

Das ist ein "LED Produkt der Klasse 1"

SICHERHEIT
ACHTUNG: GEFÄHRLICHE SPANNUNG
Das Gehäuse nicht öffnen. Das Gerät enthält keine vom Benutzer wartbaren Teile. Das Gerät steht unter Hochspannung und darf nur von qualifiziertem technischem Personal geöffnet werden. Vor Anschluß der LAN-Kabel, Gerät vom Netz trennen.

GEFAHR DURCH BLITZSCHLAG
GEFAHR: Keine Arbeiten am Gerät oder an den Kabeln während eines Gewitters ausführen.

VORSICHT: DAS NETZKABEL DIENT ZUM TRENNEN DER STROMVERSORGUNG. ZUR TRENNUNG VOM NETZ, KABEL AUS DER STECKDOSE ZIEHEN.

INSTALLATION
AUTOMATISCHE SPANNUNGSEINSTELLUNG
Dieses Gerät stellt sich automatisch auf die auf dem Etikett aufgeführten Spannungswerte ein.

KLASSE 1 GERÄTE
DIESE GERÄTE MÜSSEN GEERDET SEIN. Der Netzstecker darf nur mit einer vorschriftsmäßig geerdeten Steckdose verbunden werden. Ein unvorschriftsmäßiger Anschluß kann das Metallgehäuse Teile unter gefährliche elektrische Spannungen setzen.

NETZKABEL
Das Netzkabel sollte eine maximale Länge von 4,5 Metern, einen Nennwert von mindestens 6 A und 250 V haben, aus HAR-Material hergestellt und mit einer gepreßten, IEC 320 entsprechenden, Anschlußverbindung an einem Ende, und am anderen Ende mit einem im Land des Endverbrauchers geprüften Stecker ausgestattet sein.

MONTAGEANWEISUNGEN

VORSICHT: Diese Modelle sind für Betrieb in horizontaler Position entworfen worden. Das Gerät darf NICHT OHNE Gebrauch eines dafür entworfenen Allied Telesyn-Vertikalmontagegestells in VERTIKALER Position montiert werden.

VORSICHT: Die Entlüftungsöffnungen dürfen nicht versperrt sein und müssen zum Kühlen freien Zugang zur Raumluft haben.

VORSICHT: Die Gummifüße NICHT ENTFERNEN, außer bei Gebrauch des Allied Telesyn-Vertikalmontagegestells.

BETRIEBSTEMPERATUR
Dieses Produkt wurde für den Betrieb in einer Umgebungstemperatur von nicht mehr als 40˚ C entworfen.

ALLE LÄNDER: Installation muß örtlichen und nationalen elektrischen Vorschriften entsprechen.

Radiofrekvens forstyrrelsesemission EN55022 Klasse A

ADVARSEL: I et hjemligt miljø kunne dette produkt forårsage radio forstyrrelse. Bliver det tilfældet, påkræves brugeren muligvis at tage tilstrækkelige foranstaltninger.

Immunitet EN50082-1

Elektrisk sikkerhed. EN60950, UL1950, CSA 950.

Dette er et "PRODUKT UNDER KLASSE 1 LED"

SIKKERHED
ELEKTRISKE FORHOLDSREGLER
ADVARSEL: RISIKO FOR ELEKTRISK STØD
For at forebygge ELEKTRISK stød, undlad at åbne apparatet. Der er ingen indre dele, der kan repareres af brugeren. Denne enhed indeholder LIVSFARLIGE STRØMSPÆNDINGER og bør kun åbnes af en uddannet og kvalificeret tekniker. For at undgå risiko for ELEKTRISK STØD, afbrydes den elektriske strøm til produktet, før LAN-kablerne monteres eller afmonteres.

FARE UNDER UVEJR
FARE: UNDLAD at arbejde på udstyr eller KABLER i perioder med LYNAKTIVITET.

ADVARSEL: DEN STRØMFØRENDE LEDNING BRUGES TIL AT AFBRYDE STRØMMEN. SKAL STRØMMEN TIL APPARATET AFBRYDES, tages ledningen ud af stikket.

INSTALLATION
ELEKTRISK—AUTOMATISK SPÆNDINGSREGULERING
Dette apparat vil automatisk tilpasse sig enhver spænding indenfor de værdier, der er angivet på etiketten.

ELEKTRISK—KLASSE 1-UDSTYR
DETTE UDSTYR KRÆVER JORDFORBINDELSE. Stikket skal være forbundet med en korrekt installeret jordforbunden stikkontakt. En ukorrekt installeret stikkontakt kan sætte livsfarlig spænding til tilgængelige metaldele.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

ELEKTRISK—LEDNING
Anvend ledning af maksimum 4,5 meters længde, med en kapacitet på minimum 6 amp., 250 v, bestående af en IEC 320 connector med indstøbt HAR ledning i den ene ende og et stik i den anden ende godkendt der er af myndighederne i brugerlandet.

INSTRUKTIONER FOR OPSTILLING
IKKE FORETAGES uden brug af et Allied Telesyn vertikalt monteringsstel konstrueret til dette formål.

ADVARSEL: Ventilationsåbninger må ikke blokeres og skal have fri adgang til den omgivende luft i rummet for afkøling.

ADVARSEL: UNDLAD at fjerne gummisoklerne fra apparatet, med mindre der anvendes et Allied Telesyn vertikalt monteringsstel.

BETJENINGSTEMPERATUR
Dette apparat er konstrueret til en omgivende temperatur på maksimum 40 grader C.

ALLE LANDE: Installation af produktet skal ske i overensstemmelse med lokal og national lovgivning for elektriske installationer.

RFI Emissie EN55022 Klasse A

WAARSCHUWING: Binnenshuis kan dit product radiostoring veroorzaken, in welk geval de gebruiker verplicht kan worden om gepaste maatregelen te nemen.

Immuniteit EN50082-1

Electrische Veiligheid EN60950, UL1950, CSA 950

Dit is een "KLASSE 1 LED-PRODUKT"

VEILIGHEID
WAARSCHUWINGEN MET BETREKKING TOT ELEKTRICITEIT
WAARSCHUWING: GEVAAR VOOR ELEKTRISCHE SCHOKKEN
Gelieve het deksel niet te verwijderen, teneinde ELEKTRISCHE schokken te voorkomen. Binnenin bevinden zich geen onderdelen die door de gebruiker kunnen worden onderhouden. Dit toestel staat onder GEVAARLIJKE SPANNING en mag alleen worden geopend door een daartoe opgeleide en bevoegde technicus. Om het gevaar op ELEKTRISCHE SCHOKKEN te vermijden, moet u het toestel van de stroombron ontkoppelen alvorens de LAN-kabels te koppelen of ontkoppelen.

GEVAAR VOOR BLIKSEMINSLAG
GEVAAR: NIET aan toestellen of KABELS WERKEN bij BLIKSEM.

WAARSCHUWING: HET TOESTEL WORDT UITGESCHAKELD DOOR DE STROOMKABEL TE ONTKOPPELEN. OM HET TOESTEL STROOMLOOS TE MAKEN: de stroomkabel ontkoppelen.

INSTALLATIE
ELEKTRISCH—AUTOMATISCHE AANPASSING VAN DE SPANNING
Dit toestel past zich automatisch aan elke spanning aan, tussen de waarden op het label vermeld.

ELEKTRISCHE—TOESTELLEN VAN KLASSE 1
DIT TOESTEL MOET GEAARD WORDEN. De stekker moet aangesloten zijn op een juist geaarde contactdoos. Een onjuist geaarde contactdoos kan de metalen onderdelen waarmee de gebruiker eventueel in aanraking komt onder gevaarlijke spanning stellen.

ELEKTRISCHE—SNOEREN
Gebruik een elektrisch snoer, maximum 4,5 meter lang, berekend voor ten minste 6 ampère, 250 V, uit HAR vervaardigd, met aan het ene uiteinde een gevormde IEC 320 stekker en aan het andere uiteinde een stekker die goedgekeurd is door het land waar het toestel zal worden gebruikt.

MONTAGE-INSTRUCTIES
WAARSCHUWING: Deze modellen zijn ontworpen om te werken in HORIZONTALE stand.
VERTICALE MONTAGE mag NIET UITGEVOERD WORDEN, tenzij een daartoe speciaal ontworpen Allied Telesyn chassis voor verticale montage wordt gebruikt.

WAARSCHUWING: De ventilatiegaten mogen niet worden gesperd en moeten de omgevingslucht ongehinderd toelaten voor afkoeling.

WAARSCHUWING: De rubberen voetjes NIET van het produkt LOSMAKEN behalve wanneer een chassis voor vertikale montage van Allied Telesyn wordt gebruikt.

BEDRIJFSTEMPERATUUR
De omgevingstemperatuur voor dit produkt mag niet meer bedragen dan 40 graden Celsius.

ALLE LANDEN: het toestel installeren overeenkomstig de lokale en nationale elektrische voorschriften.

NORMES : ce produit est conforme aux normes de suivantes :

Emission d'interférences radioélectriques EN55022 Classe A

MISE EN GARDE : dans un environnement domestique, ce produit peut provoquer des interférences radioélectriques. Auquel cas, l'utilisateur devra prendre les mesures adéquates.

Immunité EN50082 - 1

Sécurité électrique EN60950, UL1950, CSA 950

Ce matériel est un "PRODUIT À DIODE ÉLECTROLUMINESCENTE DE CLASSE 1"

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

SECURITE
INFORMATION SUR L'ELECTRICITE
AVERTISSEMENT: DANGER D'ELECTROCUTION
Pour empêcher les dangers d'ELECTROCUTION, ne pas enlever le couvercle. L'équipement ne contient aucun élément réparable par l'utilisateur. Cet appareil comprend des TENSIONS DANGEREUSES et ne doit être ouvert que par un technicien dûment qualifié. Pour éviter tout risque d'ELECTROCUTION, débrancher l'appareil de la prise de courant avant de connecter ou de déconnecter les câbles LAN.

DANGER DE FOUDRE
DANGER: NE PAS MANIER l'équipement ou les CABLES pendant les périodes d'activité orageuse.

ATTENTION: LE CORDON D'ALIMENTATION SERT DE MISE HORS CIRCUIT POUR COUPER L'ALIMENTATION DE L'APPAREIL, débranchez le cordon.

INSTALLATION
ELECTRICITE—REGLAGE DE TENSION AUTOMATIQUE
Ce produit peut s'ajuster automatiquement sur n'importe quelle tension comprise dans la plage indiquée sur le label.

ELECTRICITE—EQUIPEMENT DE CLASSE 1
CET APPAREIL DOIT ETRE MIS A LA TERRE. La prise de courant doit être branchée dans une prise femelle correctement mise à la terre. Sinon, des tensions dangereuses risqueraient d'atteindre les pièces métalliques accessibles à l'utilisateur.

ELECTRICITE—INFORMATION SUR LE CORDON
Utiliser un cordon secteur de 4,5 mètres de long maximum, calibré à 6 ampères minimum, 250V, et fabriqué en câblage HAR avec connecteur IEC 32C moulé à une extrémité et à l'autre extrémité, une prise de courant mâle répondant aux normes du pays d'utilisation.

INSTRUCTIONS DE MONTAGE
ATTENTION: Ces modèles sont destiné à fonctionner en position horizontale. L'appareil NE DOIT PAS être utilisé en MONTAGE VERTICAL sans employer un châssis de montage vertical Allied Telesyn conçu à cet effet.

ATTENTION: Ne pas bloquer les fentes d'aération, ce qui empêcherait l'air ambiant de circuler librement pour le refroidissement.

ATTENTION: NE PAS ôter les pattes d'attache en caoutchouc du produit, à moins d'utiliser un châssis de montage vertical Allied Telesyn.

TEMPERATURE DE FONCTIONNEMENT
Ce produit est capable de tolérer une température ambiante maximum de 40 degrés Celsius

POUR TOUS PAYS: Installer le produit conformément aux normes électriques nationales et locales.

Radioaaltojen häirintä EN55022 Luokka A

VAROITUS: Kotiolosuhteissa tämä laite voi aiheuttaa radioaaltojen häiröitä, missä tapauksessa laitteen käyttäjän on mahdollisesti ryhdyttävä tarpeellisiin toimenpiteisiin.

Kestävyys EN50082-1

Sähköturvallisuus EN60950, UL1950, CSA 950

Tämä on "ENSIMMÄISEN LUOKAN VALODIODITUOTE"

TURVALLISUUS
SÄHKÖÖN LIITTYVIÄ HUOMAUTUKSIA
VAROITUS: SÄHKÖISKUVAARA
Estääksesi SÄHKÖISKUN älä poista kantta. Sisällä ei ole käyttäjän huollettavissa olevia osia. Tämä laite sisältää VAARALLISIA JÄNNITTEITÄ ja sen voi avata vain koulutettu ja pätevä teknikko. Välttääksesi SÄHKÖISKUN mahdollisuuden katkaise sähkövirta tuotteeseen ennen kuin liität tai irrotat paikallisverkon (LAN) kaapelit.

SALAMANISKUVAARA
HENGENVAARA: ÄLÄ TYÖSKENTELE laitteiden tai KAAPELEIDEN KANSSA SALAMOINNIN AIKANA.

HUOMAUTUS: VIRTAJOHTOA KÄYTETÄÄN VIRRANKATKAISULAITTEENA. VIRTA KATKAISTAAN irrottamalla virtajohto.

ASENNUS
SÄHKÖ—AUTOMAATTINEN JÄNNITTEENSÄÄTÖ
Tämä tuote säätää automaattisesti mihin tahansa jännitteeseen ohjetarrassa annettujen arvojen välillä.

SÄHKÖ—TYYPPILUOKAN 1 LAITTEET
TÄMÄ LAITE TÄYTYY MAADOITTAA. Pistoke täytyy liittää kunnollisesti maadoitettuun pistorasiaan. Virheellisesti johdotettu pistorasia voi altistaa metalliosat vaarallisille jännitteille.

SÄHKÖ—JOHTOON LIITTYVÄ HUOMAUTUS
Käytä seuraavanlaista virtajohtoa: maksimipituus 4,5 metriä, minimiteho 6 ampeeria, 250 V, valmistettu HAR-johdostosta, muovattu IEC 320 -liitin toisessa päässä ja käyttömaassa hyväksytty pistoke toisessa päässä.

ASENNUSSOHJEET
HUOMAUTUS: Nämä mallit on suunniteltu käytettäviksi VAAKA-asennossa. PYSTYASENNUSTA EI SAA TEHDÄ ilman Allied Telesyn -pystykiinnitysalustaa, joka on suunniteltu tähän tarkoitukseen.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

HUOMAUTUS: Ilmavaihtoreikiä ei pidä tukkia ja niillä täytyy olla vapaa yhteys ympäröivään huoneilmaan, jotta ilmanvaihto tapahtuisi.

HUOMAUTUS: ÄLÄ irroita kumijalkoja tuotteesta, ellei Allied Telesyn-pystykiinnitysalusta ole käytössä.

KÄYTTÖLÄMPÖTILA
Tämä tuote on suunniteltu ympäröivän ilman maksimilämpötilalle 40° C.

KAIKKI MAAT: Asenna tuote paikallisten ja kansallisten sähköturvallisuusmääräysten mukaisesti.

Emissione RFI (interferenza di radiofrequenza) EN55022 Classe A

AVVERTENZA: in ambiente domestico questo prodotto potrebbe causare radio interferenza. In questo caso potrebbe richiedersi all'utente di prendere gli adeguati provvedimenti.

Immunità EN50082-1

Sicurezza elettrica EN60950, UL1950, CSA 950

Questo è un "PRODOTTO CON LED DI CLASSE 1"

NORME DI SICUREZZA
AVVERTENZE ELETTRICHE
ATTENZIONE: PERICOLO DI SCOSSE ELETTRICHE
Per evitare SCOSSE ELETTRICHE non asportare il coperchio. Le componenti interne non sono riparabili dall'utente. Questa unità ha TENSIONI PERICOLOSE e va aperta solamente da un tecnico specializzato e qualificato. Per evitare ogni possibilità di SCOSSE ELETTRICHE, interrompere l'alimentazione del dispositivo prima di collegare o staccare i cavi LAN.

PERICOLO DI FULMINI
PERICOLO: NON LAVORARE sul dispositivo o sui CAVI durante PRECIPITAZIONI TEMPORALESCHE.

ATTENZIONE: IL CAVO DI ALIMENTAZIONE È USATO COME DISPOSITIVO DI DISATTIVAZIONE.
PER TOGLIERE LA CORRENTE AL DISPOSITIVO staccare il cavo di alimentazione.

INSTALLAZIONE
ELETTRICITÀ—REGOLAZIONE AUTOMATICA DELLA TENSIONE
Questo prodotto regolerà automaticamente la tensione ad un valore compreso nella gamma indicata sull'etichetta.

ELETTRICITÀ—DISPOSITIVI DI CLASSE 1
QUESTO DISPOSITIVO DEVE AVERE LA MESSA A TERRA. La spina deve essere inserita in una presa di corrente specificamente dotata di messa a terra. Una presa non cablata in maniera corretta rischia di scaricare una tensione pericolosa su parti metalliche accessibili.

ELETTRICITÀ—AVVERTENZA SUL CAVO
Usare un cavo della lunghezza massima di metri 4,5, con capacità minima di 6 A, 250 V, di filo HAR, dotato di connettore stampato IEC 320 ad un'estremità e di spina approvata dal paese di destinazione all'altra.

ISTRUZIONI PER IL MONTAGGIO
ATTENZIONE: questi modelli sono concepiti per il funzionamento in posizione ORIZZONTALE. NON È POSSIBILE EFFETTUARE IL MONTAGGIO VERTICALE senza utilizzare l'apposito telaio per il montaggio verticale Allied Telesyn.

ATTENZIONE: le prese d'aria non vanno ostruite e devono consentire il libero ricircolo dell'aria ambiente per il raffreddamento.

ATTENZIONE: NON staccare il piedino in gomma dal prodotto tranne qualora si utilizzi il telaio Allied Telesyn per il montaggio verticale.

TEMPERATURA DI FUNZIONAMENTO
Questo prodotto è concepito per una temperatura ambientale massima di 40 gradi centigradi.

TUTTI I PAESI: installare il prodotto in conformità alle vigenti normative elettriche nazionali.

RFI stråling EN55022 Klasse A

ADVARSEL: Hvis dette produktet benyttes til privat bruk, kanproduktet forårsake radioforstyrrelse. Hvis dette skjer, må brukeren tade nødvendige forholdsregler.

Immunitet EN50082-1

Elektrisk sikkerhet EN60950, UL1950, CSA 950

Dette er et "KLASSE 1 LED PRODUKT"

SIKKERHET
ELEKTRISKE MEDDELELSE
ADVARSEL: FARE FOR ELEKTRISK SJOKK
For å unngå ELEKTRISK sjokk, må dekslet ikke tas av. Det finnes ingen deler som du kan bruke på innsiden. Denne enheten inneholder FARLIGE SPENNING, og må kun åpnes av en opplært, kvalifisert tekniker. For å unngå muligheten av ELEKTRISK SJOKK, må den elektriske strømmen til produktet være av når du slår LAN ledninger av og på.

FARE FOR LYNANTENNELSE
FARE: MÅ IKKE BRUKES på utstyr eller ledninger mens LYN-AKTIVITET er i gang.

FORSIKTIG: STRØMLEDNINGEN BRUKES TIL Å SLÅ APPARATET AV. HVIS DU VIL DEAKTIVISERE UTSTYRET, må du fjerne strømledningen.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

INSTALLASJON
ELEKTRISK—AUTO SPENNINGSTILPASSING
Dette produktet vil automatisk bli tilpasset hvilken som helst strøminnstilling i de områdene som vises på etiketten.

ELEKTRISKE—TYPE 1. KLASSE UTSTYR
DETTE UTSTYRET MÅ JORDES. Strømkontakten må være tilkoplet en korrekt jordet grunnstøpselkontakt. En støpselkontakt som ikke er jordet på rett måte, kan tilføre farlig spenning til lett tilgjengelige metalldeler.

ELEKTRISKE—MEDDELELSE OM LEDNINGER
Bruk en strømledning av maksimal størrelse 4,5 m i lengde, vurdert for minst av 6 amp, 250V, fremstilt av HAR ledning IEC 320 koplingsstykke på den ene kanten og på den andre kanten en plugg som har blitt godkjent i det landet hvor den siste brukeren befinner seg.

BRUKSANVISNINGER FOR MONTERING
FORSIKTIG: Disse modellene er beregnet til bruk i HORISONTAL stilling. VERTIKAL MONTERING må IKKE UTFØRES uten bruk av et Allied Telesyn vertikal monteringschassis som er spesiallaget til dette formål.

FORSIKTIG: Luftventilene må ikke blokkeres og må ha fri tilgang til luft med romtemperatur for avkjøling.

FORSIKTIG: Gummiføttene må IKKE fjernes fra produktet med mindre en Allied Telesyn vertikal monteringschassis er i bruk.

DRIFTSTEMPERATUR
Dette produktet har blitt fremstilt til bruk med maksimum romtemperatur på 40 grader celsius.

ALLE LAND: Produktet må installeres i samsvar med de lokale og nasjonale elektriske koder.

Emissão de interferência de radiofrequência EN55022 Classe A

AVISO: Num ambiente doméstico este produto pode causar interferência na radiorrecepção e, neste caso, pode ser necessário que o utente tome as medidas adequadas.

Imunidade EN50082-1

Segurança Eléctrica EN60950, UL1950, CSA 950

Este é um "PRODUTO CLASSE 1 LED"

SEGURANÇA
AVISOS SOBRE CARACTERÍSTICAS ELÉTRICAS
ATENÇÃO: PERIGO DE CHOQUE ELÉTRICO
Para evitar CHOQUE ELÉTRICO, não retire a tampa. Não contém peças que possam ser consertadas pelo usuário. Este aparelho contém VOLTAGENS PERIGOSAS e só deve ser aberto por um técnico qualificado e treinado. Para evitar a possibilidade de CHOQUE ELÉTRICO, desconecte o aparelho da fonte de energia elétrica antes de conectar e desconectar os cabos da LAN.

PERIGO DE CHOQUE CAUSADO POR RAIO
PERIGO: NÃO TRABALHE no equipamento ou nos CABOS durante períodos suscetíveis de QUEDAS DE RAIO.

CUIDADO: O CABO DE ALIMENTAÇÃO É UTILIZADO COMO UM DISPOSITIVO DE DESCONEXÃO.
PARA DESELETRIFICAR O EQUIPAMENTO desconecte o cabo de alimentação.

INSTALAÇÃO
ELÉTRICO—AJUSTE AUTOMÁTICO DE VOLTAGEM
Este produto ajustar-se-á automaticamente a qualquer voltagem que esteja dentro dos limites indicados no rótulo.

ELÉTRICO—EQUIPAMENTOS DO TIPO CLASSE 1
DEVE SER FEITA LIGAÇÃO DE FIO TERRA PARA ESTE EQUIPAMENTO. O plugue deve ser conectado a uma tomada com ligação de fio terra. Tomadas sem ligação de fio terra podem transmitir voltagens perigosas a peças metálicas expostas.

ELÉTRICO—AVISO SOBRE O CABO DE ALIMENTAÇÃO
Use cabo de alimentação com comprimento máximo de 4, 5 metros, com uma capacidade mínima de 6 amp e 250 V, fabricado de material para cabo HAR com conector moldado IEC 320 em uma extremidade e, na outra extremidade, um plugue aprovado para uso no país em questão .

INSTRUÇÕES DE INSTALAÇÃO
CUIDADO: Este modelos foram projetados para funcionar na posição HORIZONTAL. NÃO DEVE SER EFETUADA INSTALAÇÃO VERTICAL sem o uso de um chassis de montagem vertical Allied Telesyn projetado para este fim específico.

CUIDADO: As entradas de ar não devem ser bloqueadas e devem ter acesso livre ao ar ambiente para arrefecimento adequado do aparelho.

CUIDADO: NÃO RETIRE os calços de borracha do produto a menos que esteja sendo usado um chassis de montagem vertical Allied Telesyn.

TEMPERATURA DE FUNCIONAMENTO
Este produto foi projetado para uma temperatura ambiente máxima de 40 graus centígrados.

TODOS OS PAÍSES: Instale o produto de acordo com as normas federais e locais para instalações elétricas.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Emisión RFI EN55022 Clase A

ADVERTENCIA: en un entorno doméstico, este producto puede causar radiointerferencias, en cuyo caso, puede requerirse del usuario que tome las medidas que sean convenientes al respecto.

Inmunidad EN50082-1

Seguridad eléctrica EN60950, UL1950, CSA 950

Este es un "PRODUCTO DE DIODO LUMINISCENTE (LED) CLASE 1"

SEGURIDAD
AVISOS ELECTRICOS
ADVERTENCIA: PELIGRO DE ELECTROCHOQUE
Para evitar un ELECTROCHOQUE, no quite la tapa. No hay ningún componente en el interior al cual puede prestar servicio el usuario. Esta unidad contiene VOLTAJES PELIGROSOS y sólo deberá abrirla un técnico entrenado y calificado. Para evitar la posibilidad de ELECTROCHOQUE desconecte la corriente eléctrica que llega al producto antes de conectar o desconectar los cables LAN.

PELIGRO DE RAYOS
PELIGRO: NO REALICE NINGUN TIPO DE TRABAJO O CONEXION en los equipos o en LOS CABLES durante TORMENTAS DE RAYOS

ATENCION: EL CABLE DE ALIMENTACION SE USA COMO UN DISPOSITIVO DE DESCONEXION. PARA DESACTIVAR EL EQUIPO, desconecte el cable de alimentación.

INSTALACION
ELECTRICO—AUTO-AJUSTE DE TENSION
Este producto se ajustará automáticamente a cualquier tensión entre los valores máximos y mínimos indicados en la etiqueta.

ELECTRICO—EQUIPO DEL TIPO CLASE 1
ESTE EQUIPO TIENE QUE TENER CONEXION A TIERRA. El cable tiene que conectarse a un enchufe con tierra debidamente instalado. Un enchufe que no está correctamente instalado podría ocasionar tensiones peligrosas en las partes metálicas están expuestas.

ELECTRICO—ADVERTENCIA SOBRE EL CABLE
Use un cable eléctrico con un máximo de 4, 5 metros de largo, con una capacidad mínima de 6 amperios, 250 V, hecho de cable HAR, con el conector moldeado IEC 320 en un extremo y con un enchufe que está aprobado por el país de uso final en el otro.

INSTRUCCIONES DE MONTAJE
ATENCION: Estos modelos están diseñados para operar en posición HORIZONTAL. NO SE DEBEN MONTAR VERTICALMENTE sin el uso de un chasis de montaje vertical de Allied Telesyn que se ha diseñado para este fin.

ATENCION: Las aberturas para ventilación no deberán bloquearse y deberán tener acceso libre al aire ambiental de la sala para su enfriamiento.

ATENCION: NO separe las patas de goma del producto a menos que se esté usando un chasis de montaje vertical de Allied Telesyn.

TEMPERATURA REQUERIDA PARA LA OPERACIÓN
Este producto está diseñado para una temperatura ambiental máxima de 40 grados C.

PARA TODOS LOS PAÍSES: Monte el producto de acuerdo con los Códigos Eléctricos locales y nacionales..

Radiostörning EN55022 Klass A

VARNING: Denna produkt kan ge upphov till radiostörningar i hemmet, vilket kan tvinga användaren till att vidtaga erforderliga åtgärder.

Immunitet EN50082-1

Elsäkerhet EN60950, UL1950, CSA 950

Detta är en "KLASS 1 LYSDIODPRODUKT"

SÄKERHET
TILLKÄNNAGIVANDEN BETRÄFFANDE ELEKTRICITETSRISK:
RISK FÖR ELEKTRISK STÖT
För att undvika ELEKTRISK stöt, ta ej av locket. Det finns inga delar inuti som behöver underhållas. Denna apparat är under HÖGSPÄNNING och får endast öppnas av en utbildad kvalificerad tekniker. För att undvika ELEKTRISK STÖT, koppla ifrån produktens strömanslutning innan LAN-kablarna ansluts eller kopplas ur.

FARA FÖR BLIXTNEDSLAG
FARA: ARBETA EJ på utrustningen eller kablarna vid ÅSKVÄDER.

VARNING: NÄTKABELN ANVÄNDS SOM STRÖMBRYTARE FÖR ATT KOPPLA FRÅN STRÖMMEN, dra ur nätkabeln.

INSTALLATION
ELEKTRISKT—AUTOMATISK SPÄNNINGSJUSTERING
Denna produkt justeras automatiskt till alla spänningar inom omfånget som indikeras på produktens märkning.

ELEKTRISKT—TYP KLASS 1 UTRUSTNING
DENNA UTRUSTNING MÅSTE VARA JORDAD. Nätkabeln måste vara ansluten till ett ordentligt jordat uttag. Ett felaktigt uttag kan göra att närliggande metalldelar utsätts för högspänning. Apparaten skall anslutas till jordat uttag, när den ansluts till ett nätverk.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

ELEKTRISKT—ANMÄRKNING BETRÄFFANDE KABELN
Använd en kabel med maximum längd 4,5 meter och minimum 6 amp nominal, 250V, av HAR kabelfabrikat med ett specialutformat IEC 320-kontaktdon i ena änden och i den andra en plugg som godkänts i landet där produkten används.

MONTERINGSINSTRUKTIONER
VARNING: Dessa modeller är konstruerade för användning i HORISONTALLÄGE. VERTIKALMONTERING får EJ UTFÖRAS utan att ett Allied Telesyn specialkonstruerat vertikalt monteringschassi används.

VARNING: Luftventilerna får ej blockeras och måste ha fri tillgång till omgivande rumsluft för avsvalning.

VARNING: Ta ej bort gummifötterna från produkten om inte ett Allied Telesyn vertikalt monteringschassi används.

DRIFTSTEMPERATUR
Denna produkt är konstruerad för rumstemperatur ej överstigande 40 grader Celsius.

ALLA LÄNDER: Installera produkten i enlighet med lokala och statliga bestämmelser för elektrisk utrustning.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

TurboStack™

AT-TS06F/ST, SC, SM
AT-TS08
AT-TS12F/ST, SC, SM
AT-TS12T
AT-TS12TR
AT-TS24T
AT-TS24TR

Ethernet Hubs
with Management

Installation Manual

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

© Copyright 1996 Allied Telesyn International
All rights reserved. No part of this publication may be reproduced without prior written permission from Allied Telesyn International.

Allied Telesyn International reserves the right to make changes in specifications and other information contained in this document without prior written notice. The information provided herein is subject to change without notice. In no event shall Allied Telesyn International be liable for any incidental, special, indirect, or consequential damages whatsoever, including but not limited to lost profits, arising out of or related to this manual or the information contained herein, even if Allied Telesyn International has been advised of, known, or should have known, the possibility of such damages.

Ethernet is a registered trademark of Xerox Corporation. UNIX is a registered trademark of UNIX System Laboratories. Novell and NetWare are registered trademarks of Novell, Inc. Microsoft and MS-DOS are registered trademarks and LAN Manager and Windows for Workgroups are trademarks of Microsoft Corporation. 3Com is a registered trademark of 3Com. PC-NFS is a trademark of Sun Microsystems, Inc. PC/TCP is a registered trademark of FTP Software, Inc. DECnet is a registered trademark of Digital Equipment Corporation.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Table of Contents

Electrical Safety and Installation Requirements i

Chapter 1

Overview 1
TurboStack Hubs 1
Hub Features 2
Hubs with Management 3
Hubs without Management 4
Wiring Configuration Rules 4
Chassis Configuration 4
Department Concentrator 4
Module Functions 6
Chassis Options 7
Chassis with Standard Backplane 7
Chassis with Segmented Backplane 8
Network Management 9
Network Management Planning 9
Agent Software 9
MAC Address 10
Further Information 10

Chapter 2

Hardware Installation 11
Site Preparation 11
Location 11
Ventilation 11
Power 11
Installing Hubs 12
TurboStack Port Configurations 16
Network Ports 16
RS232 Terminal Port 16
AUI Appliqué Port 17

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Hub Connection Options 17
Appliqués 17
External Transceivers 18
Network Appliqué Installation 19
Location of Appliqué Port 19
Appliqué Installation Procedures 19
Back-panel Features 24
LED Displays 24
Hub Status Indicators 24
Troubleshooting the Installation 26

Chapter 3

AT-TS06F/ST, SC, SM Connectivity 27
AT-TS06F/ST, SC, SM Modules 27
Fiber Optic (10BASE-FL) Wiring Specifications 29
Fiber Optic Connectors 30
Port Indicators 31

Chapter 4

AT-TS08 Connectivity 33
AT-TS08 Modules 33
Normal Cascade 34
10BASE2 Wiring Specifications 34
Port Status Indicators 35
AT-TS08 Port Indicators 35
Terminator Switch 36

Chapter 5

AT-TS12F/ST, SC, SM Connectivity 37
AT-TS12F/ST, SC, SM Modules 37
Fiber Optic (10BASE-FL) Wiring Specifications 39
Fiber Optic Connectors 40
Port Indicators 41

Chapter 6

AT-TS12T Connectivity 43
AT-TS12T Modules 43
50-Pin Telco Receptacle 44
Port Status Indicators 44

Chapter 7

AT-TS12TR Connectivity 47
AT-TS12TR Modules 47
RJ45 Connectors 48
Port Indicators 48

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Chapter 8

AT-TS24T Connectivity 49
AT-TS24T Modules 49
50-Pin Telco Receptacle 50
Port Indicators 50

Chapter 9

AT-TS24TR Connectivity 53
AT-TS24TR Modules 53
RJ45 Connectors 54
MDI/MDI-X Switch 54
Port Indicators 55

Appendix A

UTP Reference 57
UTP Wiring Specifications 57
UTP Hub-to-MAU Wiring 58
UTP MAU-to-MAU, Hub-to-Hub Wiring 59

Appendix B

Telco Reference 61
Wiring Specification 61
50-Pin Telco Receptacle 61
Accessories 64
50-Pin Telco-to-RJ45 Octopus Cables 64
50-Pin Telco-to-RJ45 Harmonica 64

Appendix C

IEEE 802.3 Quick Primer 65
10BASE-T 65
Four-Repeater Rule 65
10BASE-FL/FOIRL Ethernet 66
10BASE2 (Thin) Ethernet 66
10BASE5 (Thick) Ethernet 66
AUI Drop Cables 66
Propagation 67

Appendix D

Glossary 69

Appendix E

Technical Support Fax Order 75
Incident Summary 75

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Appendix F

TurboStack™ Manual Feedback 77

Appendix G

Where To Find Us 79

Appendix H

Index 81

List of Figures

Figure 1: AT-TS12TR Faceplate 2
Figure 2: 7-Slot Chassis with Segmented Backplane 5
Figure 3: 8-slot Chassis with Standard Backplane 7
Figure 4: Segmented Backplane (detail) 8
Figure 5: Location of MAC Address Label 10
Figure 6: Removing Interrepeater Bus Dust Cover 13
Figure 7: Removing Rubber Feet from Module 13
Figure 8: Reinstalling Screws 14
Figure 9: Installing a Module in a Chassis 15
Figure 10: RS232 Terminal Port 16
Figure 11: Network Port Appliqués 17
Figure 12: AT-TS06F/SC Faceplate 19
Figure 13: AUI Appliqué Assembly 20
Figure 14: AUI Appliqué 20
Figure 15: AUI Appliqué Connector Plate 21
Figure 16: AUI Connector and Ribbon Cable Assembly 21
Figure 17: Appliqué Installation 22
Figure 18: AUI Connector Interface 22
Figure 19: Module Faceplate Interface 23
Figure 20: TurboStack Hub Back Panel 24
Figure 21: AT-TS12F/SC Hub LED Displays 25
Figure 22: AT-TS06F/ST Faceplate 28
Figure 23: AT-TS06F/SC Faceplate 28
Figure 24: AT-TS06F/SM Faceplate 29
Figure 25: ST Connector for Fiber Optic Cabling 30
Figure 26: SC Connector for Fiber Optic Cabling 30
Figure 27: SM Connector for Fiber Optic Cabling 31
Figure 28: AT-TS06F/SC Port Activity LEDs 31
Figure 29: AT-TS08 Faceplate 33
Figure 30: AT-TS08 Cascade connection 34
Figure 31: BNC-T at End of 10BASE2 Segment 35
Figure 32: BNC Connector at End of Segment with Internal Termination 35
Figure 33: AT-TS08 Port Indicators 36
Figure 34: AT-TS12F/ST Faceplate 38
Figure 35: AT-TS12F/SC Faceplate 38
Figure 36: AT-TS12F/SM Faceplate 39
Figure 37: ST Connector for Fiber Optic Cabling 40
Figure 38: SC Connector for Fiber Optic Cabling 40
Figure 39: SM Connector for Fiber Optic Cabling 41
Figure 40: AT-TS12F Port Activity LED symbols 41

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Figure 41: AT-TS12T Faceplate 43
Figure 42: 50-Pin Telco Receptacle 44
Figure 43: AT-TS12T Port LEDs 44
Figure 44: AT-TS12TR Faceplate 47
Figure 45: RJ45 Connector 48
Figure 46: AT-TS12TR Port LEDs 48
Figure 47: AT-TS24T Faceplate 49
Figure 48: 50-Pin Telco Receptacle 50
Figure 49: AT-TS24T Port LEDs 50
Figure 50: AT-TS24TR Faceplate 53
Figure 51: RJ45 Connector 54
Figure 52: MDI/MDI-X Switch 55
Figure 53: AT-TS24TR Port LEDs 55
Figure 54: RJ45 Cable 58
Figure 55: Hub-to-MAU Wiring (A) Usable and (B) Unusable 58
Figure 56: Hub-to-Hub or MAU-to-MAU Wiring 59
Figure 57: 50-Pin Telco Receptacle 61
Figure 58: AT-ADAPT-2 Telco-to-RJ45 Harmonica Adapter for AT-TS12T 64

List of Tables

Table 1: TurboStack Hubs with Management 3
Table 2: TurboStack Hubs without Management 4
Table 3: ATI Network Port Appliqués 18
Table 4: ATI Micro Transceivers 18
Table 5: AT-TS06F Hubs with Management 27
Table 6: AT-TS12F Series Hubs with Management 37
Table 7: Usable and Unusable Twisted Pair Cable 57
Table 8: 50-Pin Telco Pin-Out 62

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Chapter 1
Overview

This manual describes the hardware features and installation procedures for ATI's set of independently manageable TurboStack™ (TS) hubs. The TurboStack family also includes "Slave" modules that are not manageable as standalone devices (the AT-TS12FS/SM, ST, SC; AT-TS24TS; and AT-TS24TRS models). These devices have their own manual and are not described here. For information on the software installation and network management aspects of TurboStack hubs, see the separate *TurboStack™ AT-S10 Firmware Module For TurboStack Hubs Operations Manual* shipped with each manageable hub.

TurboStack Hubs

TurboStack multiple-port hubs offer maximum flexibility and redundancy for department needs. They are IEEE 802.3 compliant/Ethernet compatible and support Simple Network Management Protocol (SNMP) with both the second version of the Management Information Base (MIB-II) and hub MIB (also known as Hub MIB).

Note

This manual refers to two or more chassis-mounted hubs, at least one of which is manageable, as a *department concentrator*. The term *hub* refers to either a standalone hub (i.e., a single manageable hub) or a department concentrator configuration.

Each hub is manageable by the Master as a single building block for TurboStack chassis ((department concentrator) configurations with (segmented backplanes. Allied Telesyn International (ATI) supplies a rackmount department concentrator chassis that can hold up to six hubs in combination with either the AT-TS90TR or the AT-TS95TR switch module in the bottom slot of the chassis. Installation of a switch module is optional and requires use of a segmented backplane instead of the standard backplane used for non-segmented hubs.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

The TurboStack department concentrator chassis can be configured to connect hubs across a standard (or non-segmented) backplane. In this configuration, a fully populated department concentrator comprising eight hubs behaves as a single hub in the network topology. This enables you to build and reconfigure networks easily, efficiently, and at minimum expense.

Note

For a detailed explanation of ATI's TurboStack chassis/backplane offerings, refer to the *TurboStack™ Chassis and Backplanes Installation Manual*. This manual describes the physical features and installation procedures for the chassis models.

Hub Features

TurboStack hubs are based on ATI's proprietary Application-Specific Integrated Circuit (ASIC) developed for maximum functionality and reliability. Figure 1 shows a sample TurboStack hub faceplate, in this case a Model AT-TS12TR.

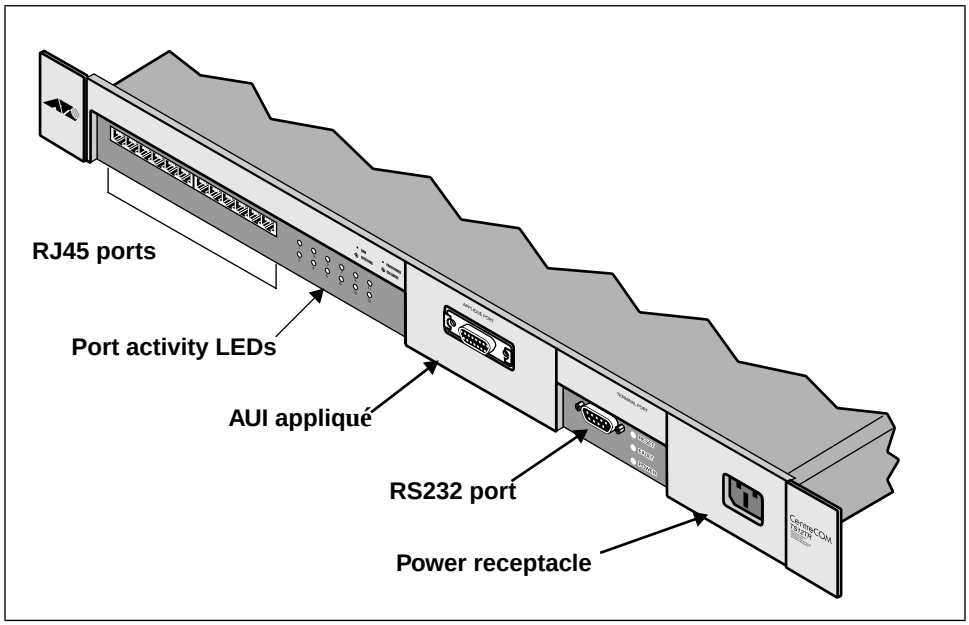

Figure 1: AT-TS12TR Faceplate

Each TurboStack hub with management capability is self-contained and provides the following standard features regardless of the media type or number of ports:

- Internal universal power supply
- IEEE 802.3 compliance; Ethernet Version 1.0 and 2.0 compatible hub functionality
- Appliqué port supports optional transceiver modules for backbone or interhub connectivity:
  - — Unshielded Twisted Pair (UTP) (10BASE-T); RJ45
  - — Thinnet (10BASE2)
  - — Attachment Unit Interface (AUI) (10BASE5)
  - — Fiber optic(10BASE-FL); SM, SC, or ST
- Placement options include standalone, 19-inch rack mount or chassis mount

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

- Three types of network management capability:
  - — SNMP
  - — Via ASYNC ASCII terminal port (Omega)
  - — Telnet (Omega)
- Software upgrade through firmware cassette or in-band downloading
- Hot swapping of modules in chassis
- Comprehensive diagnostic LED support
- Storage of up to 300 addresses per hub module
- Updates to the MAC address table are effected dynamically in Learning Mode or manually by the user.
- Inventory management through storage of multiple addresses on MAC address table
- Security feature to handle intrusions when secure mode locks MAC address table

Hubs with Management

Table 1 shows the various models of manageable TurboStack hubs with management capability. You can mix any combination of these models in a department concentrator chassis for maximum flexibility. Subsequent chapters of this manual describe the individual model types in detail, including faceplate design, connection type and LED displays.

Table 1: TurboStack Hubs with Management

Model Number	Port Count	Media/Connector Type
AT-TS06F/ST	6	Fiber Optic (10BASE-FL) with Straight Tip (ST) Connectors
AT-TS06F/SC	6	Fiber Optic (10BASE-FL) with Subscriber Channel(SC) Connectors
AT-TS06F/SM	6	Fiber Optic (10BASE-FL) with Sub Miniature Assembly (SMA) Connectors
AT-TS08	8	Thinnet (10BASE2) with Bayonet Nut Couple (BNC) Connectors
AT-TS12F/ST	12	Fiber Optic (10BASE-FL) with Straight Tip (ST) Connectors
AT-TS12F/SC	12	Fiber Optic (10BASE-FL) with Subscriber Channel (SC) Connectors
AT-TS12F/SM	12	Fiber Optic (10BASE-FL) with Sub Miniature Assembly (SMA) Connectors
AT-TS12T	12	UTP (10BASE-T) with Telco 50-pin (RJ21) Connector
AT-TS12TR	12	UTP (10BASE-T) with RJ45 Connectors
AT-TS24T	24	UTP (10BASE-T) with two Telco 50-pin (RJ21) Connectors
AT-TS24TR	24	UTP (10BASE-T) with RJ45 Connectors

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Hubs without Management

In addition to the TurboStack hubs with management, ATI offers six models *without management* (i.e., Slave modules). When used in conjunction with the managed hubs listed in Table 1, the TurboStack Slave hubs become SNMP manageable. Table 2 details the specific model number, port count and media/connector type available for these Slave hubs.

Table 2: TurboStack Hubs without Management

Model Number	Port Count	Media/Connector Type
AT-TS12FS/SM	12	Fiber Optic (10BASE-FL) with Sub Miniature Assembly (SMA) connectors
AT-TS12FS/SC	12	Fiber Optic (10BASE-FL) with Subscriber Channel (SC) Connectors
AT-TS12FS/ST	12	Fiber Optic (10BASE-FL) with Straight Tip (ST) Connectors
AT-TS24TS	24	Two 50-Pin Telco Connectors
AT-TS24TRS	24	24 RJ45 Connectors

Note

References in this manual to SMA and SM are interchangeable, both being acronyms for Sub Miniature Assembly.

Attention

For additional information about the TurboStack slave hubs, refer to the *TurboStack™ AT-TS12FS/ST, SC, SM; AT-TS24TRS; AT-TS24TS Ethernet Slave/Manageable Hubs Installation Manual* available on request through your ATI sales reperesentative.

Wiring Configuration Rules

Depending on the medium you choose, there are certain wiring practices you should follow to ensure the reliability of communication throughout the network. TurboStack hubs comply with IEEE standards for 802.3 Carrier Sense Multiple Access with Collision Detection (CSMA/CD) Ethernet; you should refer to these standards when implementing your network. Some important guidelines for ensuring integrity in network wiring appear in later chapters and the appendices of this manual.

Chassis Configuration

Department Concentrator

You can use a single manageable TurboStack hub in standalone mode or as part of a department concentrator housed in a chassis. Various chassis models are available for desktop or rackmount configurations. These include 1-, 2-, 3-, 4-, 7-, and 8-module combinations for desktop or 19-inch rackmount installations with standard or segmented backplanes.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

You can use any combination of TurboStack and AT-3600 Series hubs in the same department concentrator. In this configuration, however, only the management features of AT-S4 firmware apply to all the installed department concentrator units. You must install only TurboStack hubs in the same department concentrator to enable the full range of TurboStack features running AT-S10 firmware,.

Note

Not all slots have to be populated and populated slots do not have to be contiguous. The Master is the top-most module. Any Slave above the Master will not be managed.

A variety of department concentrator chassis models is available for TurboStack products. These include chassis with segmented backplanes. These chassis address a range of needs for different sized networks and uses. Call your ATI sales representative for details.

Attention

Chassis equipped with fans have variable voltage settings—either 120V or 240V. To avoid overheating, check the specific chassis model to determine the correct voltage setting.

Figure 2 shows a sample TurboStack department concentrator using the 7-slot chassis model segmented backplane. You can configure up to six TurboStack hubs in these rackmount models.

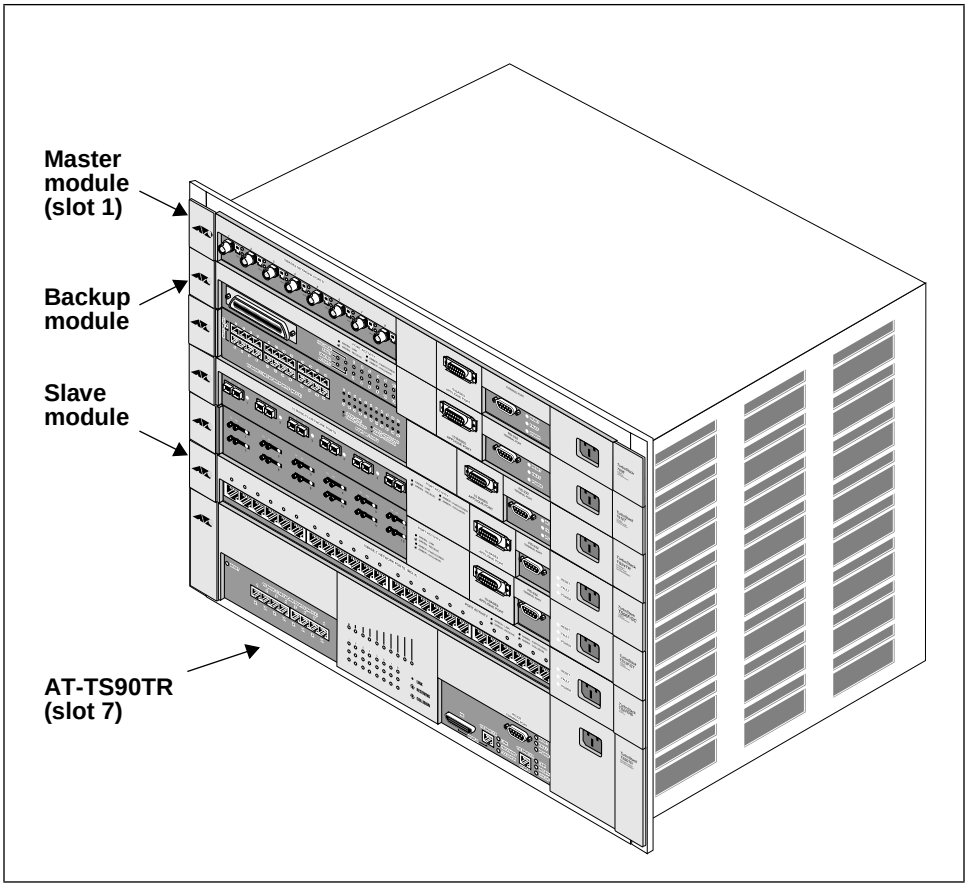

Figure 2: 7-Slot Chassis with Segmented Backplane

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

In the seven-slot department concentrator shown in Figure 2, up to 90 ports can be monitored:

- One Master containing *eight* 10BASE2 station ports
- Two hubs with management containing a total of *twelve* (RJ-21) 10BASE-T station ports, *twenty-four* (RJ-45) station ports, and *two* AUI ports
- Two hubs with management containing a total of *six* (SC) 10BASE-FL station ports, *twelve* (ST) 10BASE-FL station ports, and *two* AUI ports
- One Slave hub containing *twenty-four* RJ45 station ports for UTP (The AUI port is not available because of its backplane location).

Note

Depending on the model used, the AUI network port on some slave modules cannot be used in a seven-slot department concentrator because they reside on the back panel of the repeater and are blocked by the backplane.

You can mount all or any combination of TurboStack hubs in the same department concentrator chassis. Once installed, the AT-S10 network management software views the concentrator as a single logical device.

Note

If you have configured your chassis with both AT-3600 Series modules and TurboStack modules, you will need to download all units with AT-S4 firmware. All modules in the department concentrator will then function as AT-3600 hubs and the TurboStack security features will be disabled.

Module Functions

In the department concentrator configuration, the modules perform different functions:

- The top module becomes the *Master*. It downloads software to and serves as the reporting unit for other units in the concentrator. It also controls the management functions.
- The module in the slot directly below the Master becomes the *Backup*. It assumes management functions if the Master is removed.

Note

Both the Master and the Backup modules must have management capability.

- All hub modules between the Master or Backup and the switch in the bottom chassis slot function as Slaves. They report management information to the Master but do not perform any control functions.
- The bottom slot of the 7-slot chassis may be occupied by either the AT-TS90TR switch or the AT-TS95TR switch.

Note

The bottom slot of the 7-slot chassis may be left empty. If there is no switch in the bottom slot, however, there will be no communication between the installed units.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Chassis Options

ATI offers a variety of desktop and rackmount chassis. These chassis are available with either standard or segmented backplane configurations.

Chassis with Standard Backplane

An ATI chassis equipped with a standard backplane can hold up to a maximum of eight TurboStack hubs connected through the standard backplane mounted in the inside back wall of the chassis.

Figure 3 shows ATI's 8-slot chassis with fans and standard backplane.

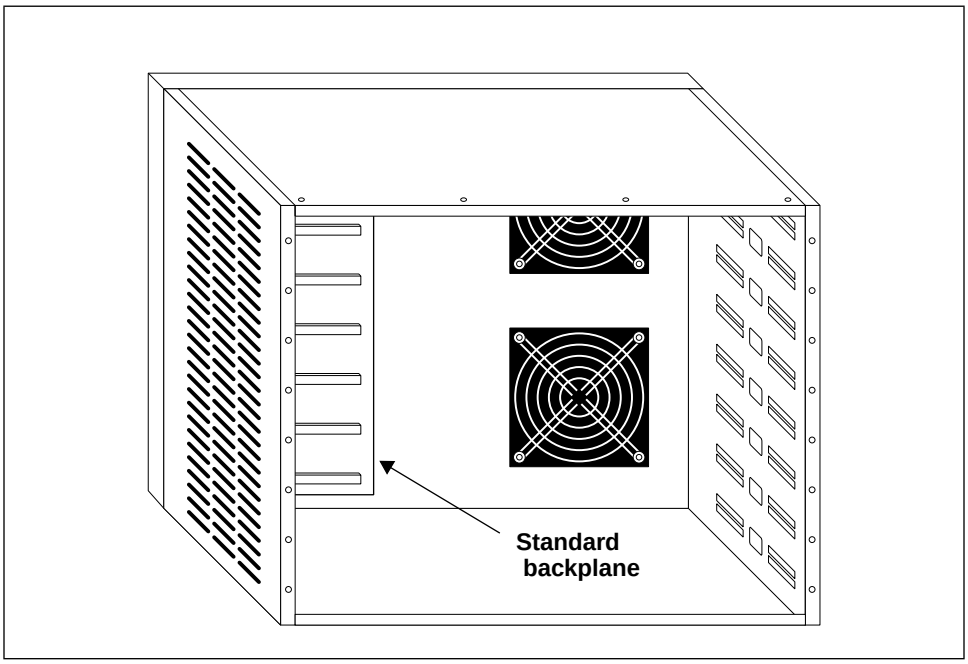

Figure 3: 8-slot Chassis with Standard Backplane

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Chassis with Segmented Backplane

In a 7-slot segmented backplane chassis, you can install up to six TurboStack hubs (i.e., one Master and five manageable modules). The seventh slot is available for a switch.

The 7-slot TurboStack department concentrator chassis incorporates a factory-installed *segmented* backplane, shown inFigure 4.

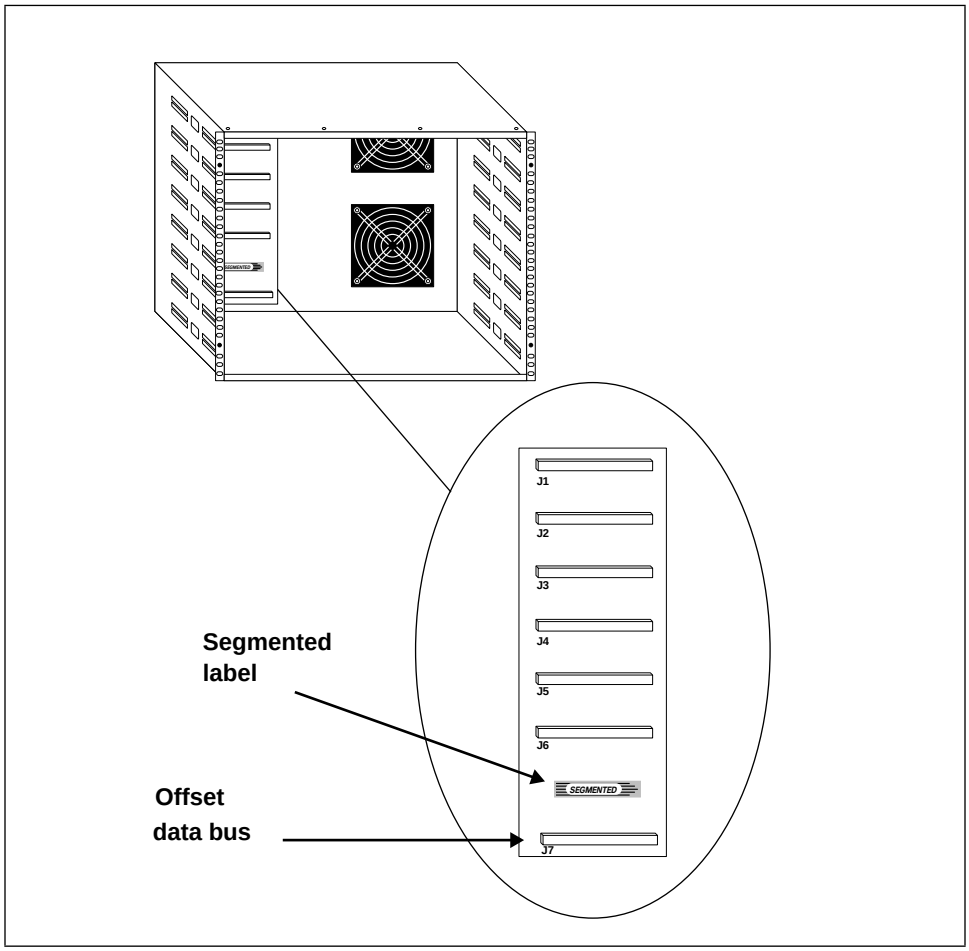

Figure 4: Segmented Backplane (detail)

In a department concentrator configuration with segmented backplane, the Master unit provides management for each lower-level module (except the switch in Slot 7) through the management bus. The flow of data between (to/from) each port on an installed hub module and the network backbone is governed by the switch module in the bottom chassis slot. (As shown in Figure 4, the backplane receptacle for the switch module is offset from the other backplane receptacles.)

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Network Management

Network Management Planning

Before installing and connecting manageable TurboStack hubs at various site locations (such as in closets in a single building or in closets on different floors or in different buildings), you need to decide on the number of hubs in your network and where each hub is to be located. This advanced planning will facilitate the assignment of hub names, MAC and/or IP addresses. It will also maximize the efficiency of network management once your hubs are fully installed and operational.

If you have a limited number of workgroup terminals and/or devices co-located on the same floor, for example, you may decide to manage each hub locally in a standalone configuration. In this scenario, a non-TCP network may be appropriate.

If you have many geographically dispersed subnetworks, each connected to its own department concentrator, management of these multiple hubs remotely in a central-site configuration may require TCP/IP network management.

Any manageable TurboStack hub can be configured for local or central-site management. The Omega agent allows local hub management through the front console serial port connected directly to a terminal or PC.

Agent Software

ATI provides every manageable TurboStack hub with a pre-installed software program called Omega. Omega enables network management either locally through an RS232 terminal port or remotely through a Telnet session. The Omega agent also supports industry-standard SNMP Network Management Stations.

Should the Master (or top unit in the chassis) be removed or fail, the Backup (or second from the top unit) takes over the Master functions automatically. You can hot swap any module without interrupting hub management functions.

Note

Both the Master and the Backup modules must have management capability in order to ensure continuous management functionality.

The TurboStack agent software is easy to upgrade through the firmware cassette port. When you insert an optional AT-S10 firmware cassette into this port, at power-up the new firmware providing enhanced security features is copied to the hub's onboard non-volatile flash memory.

Refer to the *TurboStack™ AT-S10 Firmware Module For TurboStack Hubs Operations Manual* for additional information.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

MAC Address

Every “intelligent” ATI hub (i.e., hubs with management capability) is provided with a factory-installed unique 6-byte (12-digit) Media Access Control (MAC) address. This address includes a 3-byte (6-digit) company identification number.

The MAC address is a unique number assigned to each node using the network. These MAC addreses are used to resolve conflict when multiple computers are trying to access the network simultaneously. This IEEE physical storage location address resides in the MAC PROM and is accessed through an ASCII terminal.

In order to make this address easily accessible and externally visible, a MAC address label is etched on the vertical edge of the right-hand plastic flap, as shown in Figure 5.

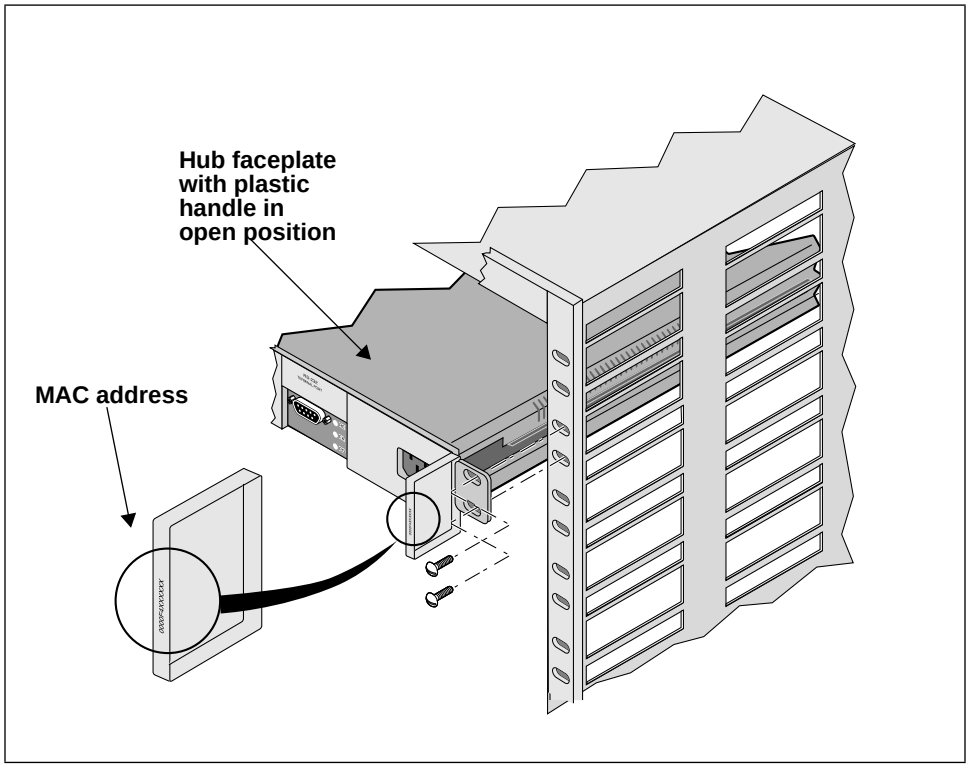

Figure 5: Location of MAC Address Label

Further Information

For further information on AT-S10 management capabilities and installation, see *TurboStack™ AT-S10 Firmware Module For TurboStack Hubs Operations Manual.*

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Chapter 2
Hardware Installation

Site Preparation

Attention

Improper installation of the chassis can expose personnel to high voltages, risking the possibility of injury or death. Before installing TurboStack hubs, read the See Electrical Safety and Installation Requirements on page i.

Location

A TurboStack hub can operate as a standalone product, or installed in a chassis or in a 19-inch rack.

Ventilation

The site must have adequate ventilation to provide an operating environment consistent with TurboStack specifications. Hubs have internal fans to aid in cooling. Chassis models are also equipped with fans. For the fans to function correctly, you must not block the ventilation openings located on the sides of the chassis.

Attention

Maximum ambient temperature is 40^{o} C with a department concentrator chassis.

Power

Power connections for each unit should be able to provide 50 watts at 120 VAC for U.S.A. versions or 240VAC for international versions. It is advisable to use dedicated power circuits or power conditioners to supply power to the network devices. This aids in isolating the network equipment from electrical power “noise.”

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Installing Hubs

This section contains two separate procedures for installing manageable TurboStack hubs:

- ❑ Standalone installation
- ❑ Installation in a chassis

Installing a standalone hub

The following procedure details how to install a TurboStack hub in a standalone configuration:

1. Plug one end of the power cord into the repeater's power receptacle and the other end into a power outlet.
2. Check to see that the Power and Master indicators illuminate. If only the Power indicator illuminates, the hub will have no management. You will also hear a soft, humming sound caused by the internal fans in the unit.
3. Plug your data cables into the hub and the network device. The Link indicator for each connected port will illuminate (except on the AT-TS08).
4. If one or more of the ports are transferring data, the Receive indicator will illuminate.
5. The hub is now ready to be managed.

Installing a hub module in a chassis

The following procedure details how to install a TurboStack hub in a chassis. This procedure is based on the assumption that another module in the chassis is already functioning as the Master unit. The Master unit must be installed in the uppermost slot. In powering up multiple hubs installed in a chassis, always start with the Master unit.

Attention

When installing multiple ATI hubs in a chassis with power, setting the chassis voltage switch too high (at 240V when 120V is required) will cause overheating of the fans. Setting the voltage too low (at 120V when 240V is required) will reduce the effectiveness of the fans and thus cause overheating of the installed hub modules. Check the specific chassis model to determine the correct voltage setting.

Attention

You should always quit the Omega management program at the end of each session. Otherwise, you might encounter such problems as not being able to exchange management hubs in a chassis.

Note

If you need to reinstall or update the network management software in a hub module, refer to the *TurboStack™ AT-S10 Firmware Module for TurboStack Hubs Operations Manual.*

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

1. Every TurboStack hub is shipped with a dust cover on the interrepeater bus port, located on the back of the TurboStack module, to prevent static discharge and/or damage to the connector pins. Before the module is installed in a chassis, *the dust cover must be removed*, as shown in Figure 6.

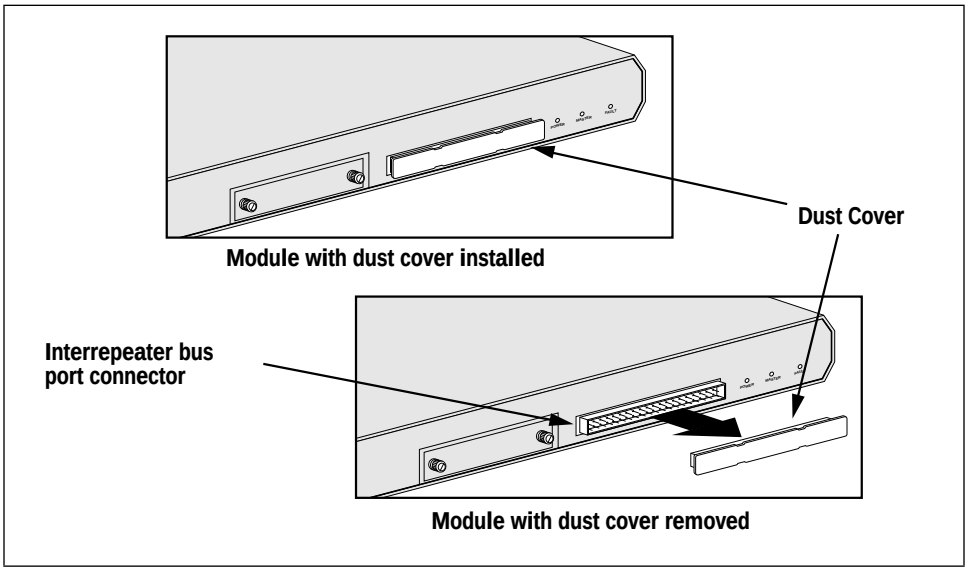

Figure 6: Removing Interrepeater Bus Dust Cover

2. Remove the rubber feet from the module (see Figure 7).

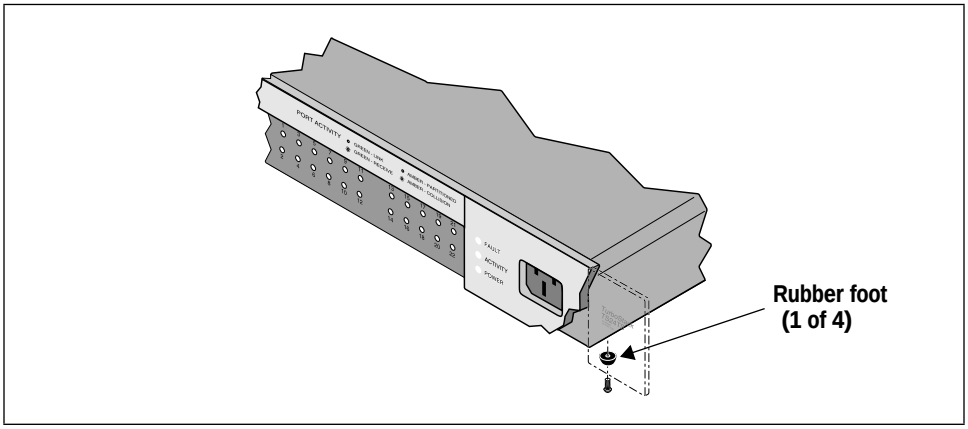

Figure 7: Removing Rubber Feet from Module

3. Be sure to reinstall the screws after removing the rubber feet to prevent the module casing from expanding and warping (see Figure 8).

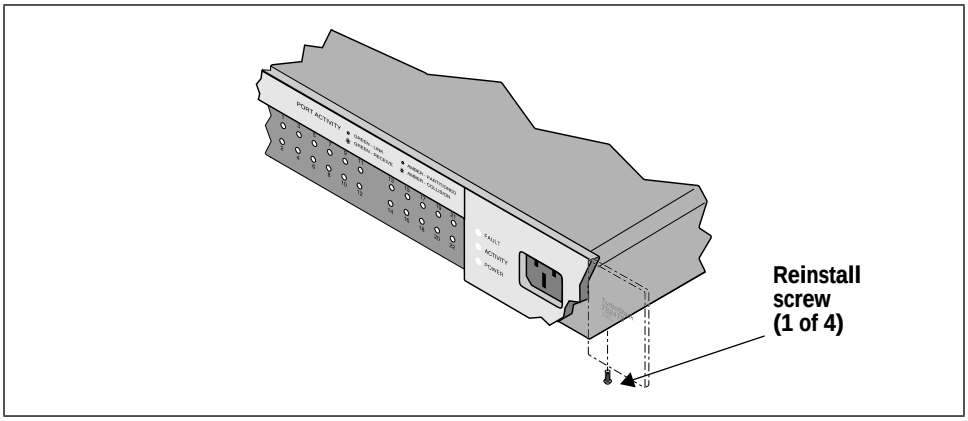

Figure 8: Reinstalling Screws

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Note

When inserting or removing repeater modules (using the hot swapping method), you must be sure that the power cord is plugged in. To enable hot swapping, you must disconnect the module from the backplane before you unplug the power cord.

4. Flip open (toward you) the two plastic doors on either side of the repeater front panel. (See Figure 9 below.)
5. Align the guide rails on either side of the module with the grooves in the chassis slot. Then, slide the module into the chassis without seating it in the backplane connector.

Note

If you use a chassis with a segmented backplane, hubs may be installed only in slots 1 through 6, with slot 7 reserved for a switch module. If you use a chassis with a standard backplane, hubs may be installed in any of the chassis slots.

6. Plug in the module's power cord.
7. Check to see that the Power indicator illuminates.
8. Seat the module carefully and firmly in the backplane.
9. Check to see that the Master indicator turns off. This indicates that the module is not functioning as a Master unit in the chassis (if that is your intended functionality for this module).

Attention

Upon initial power-up, the LEDs (including the red fault lights) on all units connected through a chassis backplane will activate. This is a normal cycling function and is not any indication of a problem.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

10. Secure the module in the chassis slot by screwing the module in place (see Figure 9). Then, snap closed the plastic doors.

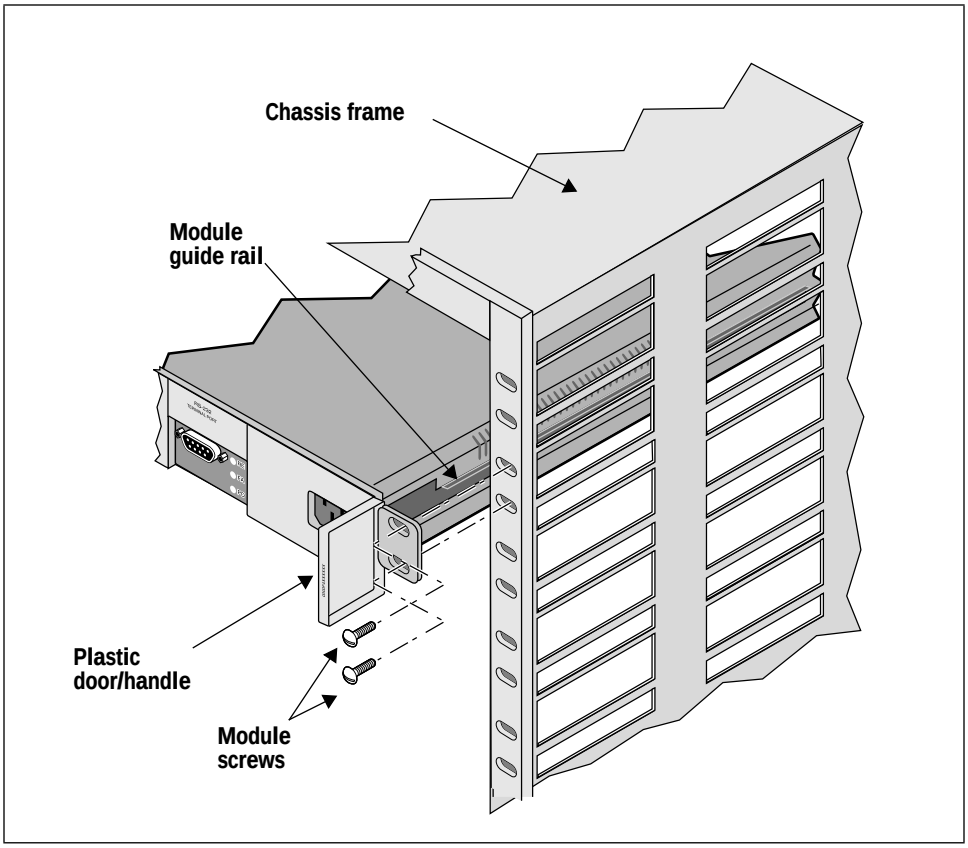

Figure 9: Installing a Module in a Chassis

11. Connect your data cables to the hub and the network. Check the Link indicators.
12. If one or more of the ports on the module are transferring data, the Receive indicator will illuminate.
13. The module is now active in the chassis as a component of a network concentrator.

For confirmation, you can obtain hub and port status information via network management. To enable management from a PC monitor, the PC must be connected to the Master through the Master's RS232 port. For further details, refer to the*TurboStack™ AT-S10 Firmware Module For TurboStack Hubs Operations Manual.*

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Note

If you have configured your chassis with both AT-3600 Series modules and TurboStack modules, you will need to refer to the *AT-3600 Series Hub/ Repeaters and AT-S4 Firmware Module Network Operations Manual*. The AT-S10 software will not run on a chassis configuration that includes both AT-3600 and TurboStack modules. See your ATI sales representative for further details.

Attention

If a fault light illuminates and/or the port activity (link) LEDs on the Master module illuminate when you first power up a hub, there may be a problem with the unit. The recommended sequence of corrective steps is as follows: 1) turn off the power and power up a second time; 2) insert a firmware cassette in the back-panel port of the unit; 3) initiate a Return Material Authorization (RMA) to ATI.

For a detailed explanation of ATI's TurboStack chassis offerings, refer to the *TurboStack™ Chassis and Backplane Installation Manual*, available through your local ATI sales representative.

TurboStack Port Configurations

Network Ports

TurboStack hub models feature a variety of port counts and support a variety of media, including:

- ❑ Fiber optic (10BASE-FL), using SM, SC or ST connectors
- ❑ Thinnet (10BASE2), using BNC connectors
- ❑ UTP/STP (10BASE-T), using Telco RJ21 or RJ45 connectors
- ❑ Thick Ethernet (10BASE5), using the AUI connector

RS232 Terminal Port

Every TurboStack hub with management capability includes an RS232 Terminal Port on the faceplate. (See Figure 10.)

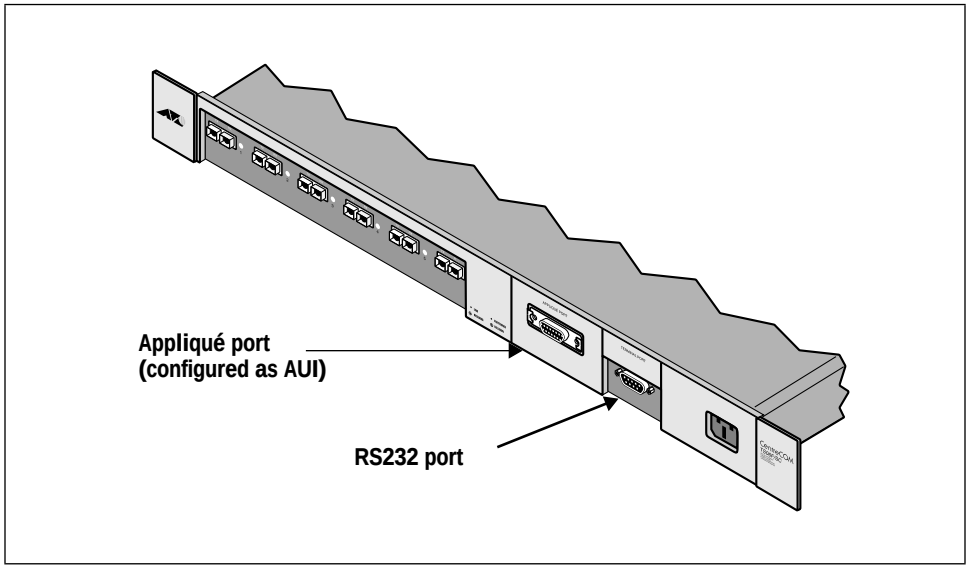

Figure 10: RS232 Terminal Port

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

The principal use for the RS232 port is connection of a local network management terminal to access Omega. For more information, refer to the *TurboStack™ AT-S10 Firmware Module for TurboStack Hubs Operations Manual.*

AUI Appliqué Port

Each manageable TurboStack hub has a convertible AUI port located on the front panel. You may use this port to connect the hub to the network. In a department concentrator configuration, you might typically use one module's AUI port for the network connection and the other modules' AUI ports for station connections.

Figure 10 (above) shows this port configured as an AUI appliqué for 10BASE5. This port is convertible on all TurboStack hubs that have management capability. You may configure it by replacing the network-interface appliqué, as described below and in the *TurboStack™ AT-TSAx Appliqués Installation Manual* shipped with all ATI appliqué kits.

Note

The AUI port on TurboStack hubs without management capability (i.e., "Slave" models) are permanently installed. They may not be converted. The fixed AUI port resides on the front panel of each AT-TS12FS/SM, SC, or ST slave module and on the back panel of each AT-TS24TRS and AT-TS24TS slave module.)

Hub Connection Options

You can adapt individual hubs in a department concentrator to different network media using either ATI external transceivers or internal appliqués.

Appliqués

Optional appliqués are available for connection with fiber optic (SM, SC, or ST), thinnet (BNC), or UTP (RJ45) cabling, in addition to the AUI interface. Figure 11 shows the different TurboStack appliqués available.

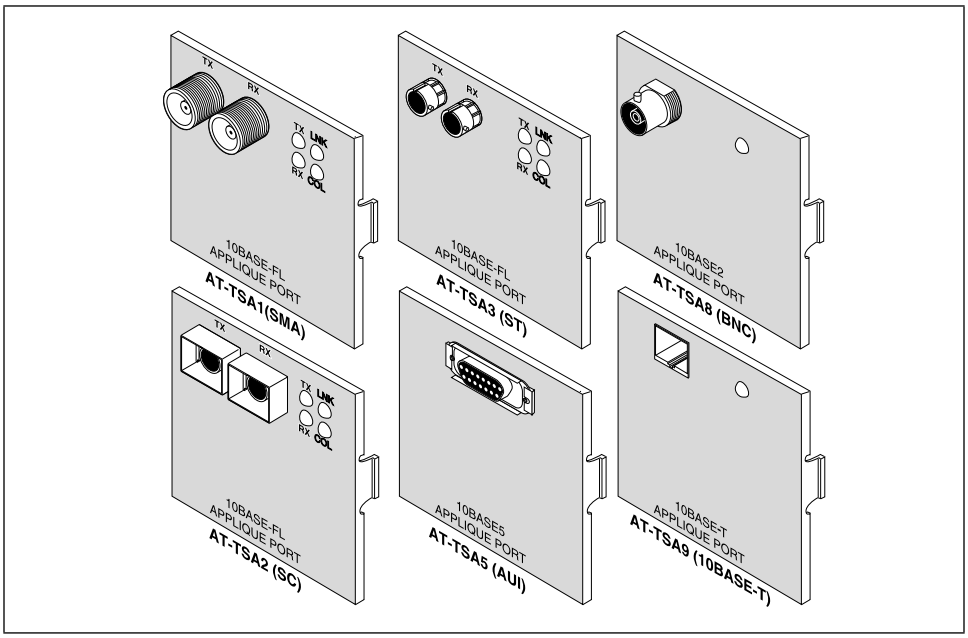

Figure 11: Network Port Appliqués

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

You can combine any TurboStack hub model type with any of the six network port appliqués listed in Table 3.

Table 3: ATI Network Port Appliqués

Model	Description
AT-TSA1	SM/SMA Fiber Optic Port
AT-TSA2	SC Fiber Optic Port
AT-TSA3	ST Fiber Optic Port
AT-TSA5	AUI Port
AT-TSA8	BNC Port
AT-TSA9	RJ45 Port

Note

In swapping appliqués, it is advisable to turn off power to the hub since you will be loosening screws and installing metal parts through the appliqué port. Loose metal parts can cause damage to the circuit boards and components.

External Transceivers

Another option is to configure the AUI network port for other media by using an external transceiver. Table 4 lists the ATI micro transceivers available for this purpose.

Table 4: ATI Micro Transceivers

Model	Description
AT-MX10/MX10S	Thin Ethernet (10BASE2), BNC Connector
AT-MX40F/ST	Fiber Optic (10BASE-FL), ST Connector
AT-MX50F/SM	Fiber Optic (10BASE-FL), SMA Connector
AT-MX55F/SC	Fiber Optic (10BASE-FL), SC Connector
AT-210T/210TS/MX20T	UTP (10BASE-T), RJ45 Connector

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Network Appliqué Installation

In a TurboStack department concentrator chassis, you can connect manageable hubs to network zones using different cable media by installing different appliqués.

Location of Appliqué Port

To install or remove an appliqué, find the TurboStack hub appliqué port. As shown in Figure 12, this port is located directly to the left of the RS232 terminal port on the module faceplate (in this case an AT-TS06F/SC model hub).

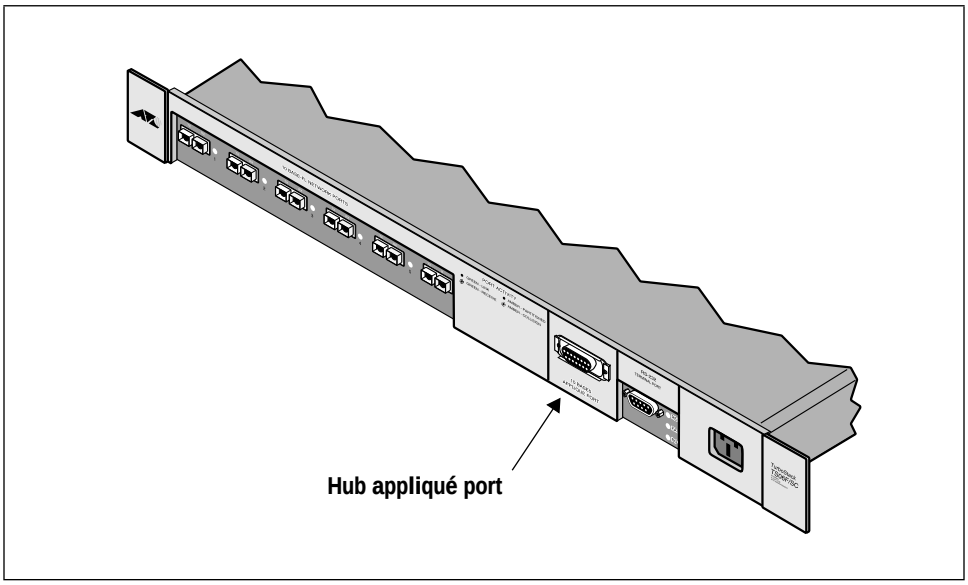

Figure 12: AT-TS06F/SC Faceplate

The appliqué port is convertible on all TurboStack hubs with management. You may reconfigure it by installing an alternative to the AUI network-interface appliqué as described below.

Appliqué Installation Procedures

Appliqués attach to a TurboStack hub on the front panel. Specific appliqué installation and removal procedures are described below.

To remove an AUI appliqué

1. Snap off the plastic cover plate on the factory-installed AUI appliqué connector port shown in Figure 12. (See also the AT-TSA5 illustration in Figure 11).

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

2. Detach the AUI appliqué assembly from the hub faceplate by loosening the two M3x6 flat-head screws to the far right and left on the connector plate, shown in Figure 13.

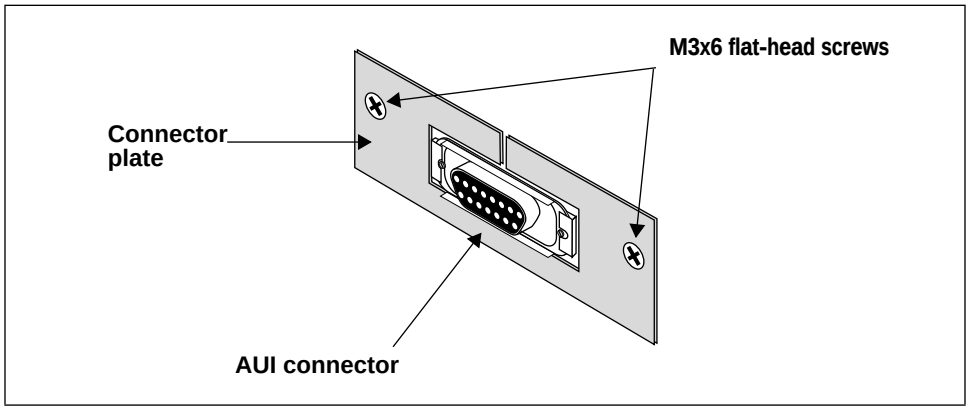

Figure 13: AUI Appliqué Assembly

Note

Do not unscrew the AUI slide kit screws that secure the AUI connector to the appliqué plate until the *entire appliqué assembly* (i.e., AUI connector, connector plate, and attached ribbon cable) pops out. The washers and nuts on the back of the slide kit may fall inside the hub module and will be difficult to retrieve.

3. Carefully pull the AUI appliqué assembly from the hub faceplate to expose the ribbon cable (shown in Figure 14 below).
4. Remove the slide-kit screws shown in Figure 14. This will detach the AUI connector from the appliqué connector plate shown in Figure 15.

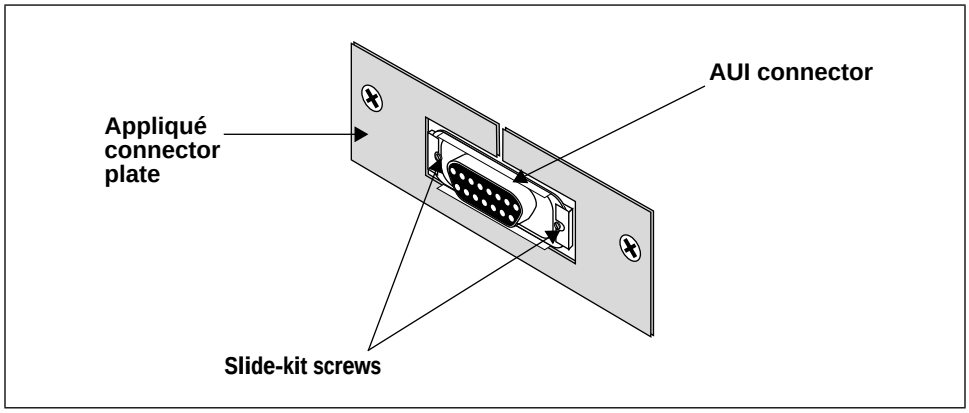

Figure 14: AUI Appliqué

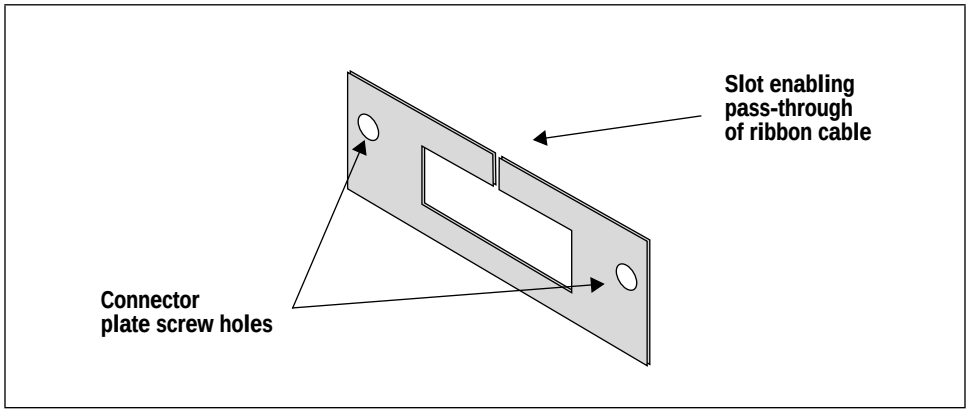

Figure 15: AUI Appliqué Connector Plate

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

5. Separate the AUI appliqué connector plate (shown in Figure 15) from the ribbon cable (shown in Figure 16) by rotating the cable 90° and sliding it through the slot in the connector plate.

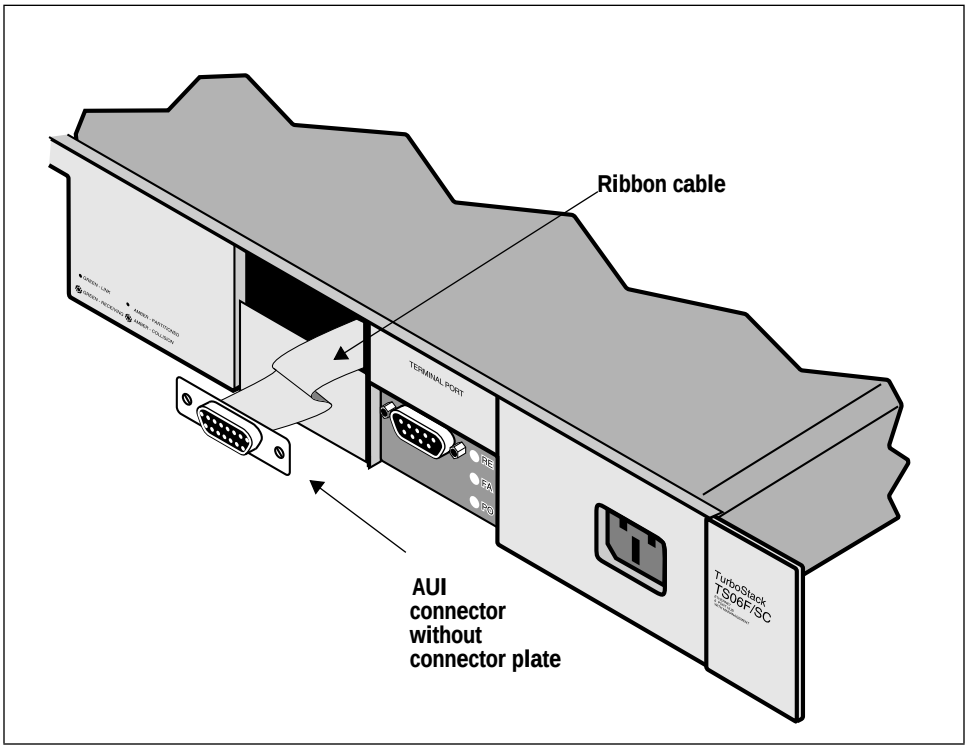

Figure 16: AUI Connector and Ribbon Cable Assembly

6. Store the detached AUI appliqué plate, slide kit screws, washers, and nuts in a secure container for future use.

To install a 10BASE2, 10BASE-T or fiber Optic (10BASE-FL) appliqué

1. Remove the AUI appliqué (as described above).
2. Plug the replacement 10BASE2, 10BASE-T, or 10BASE-FL appliqué into the AUI connector, as shown in Figure 17.

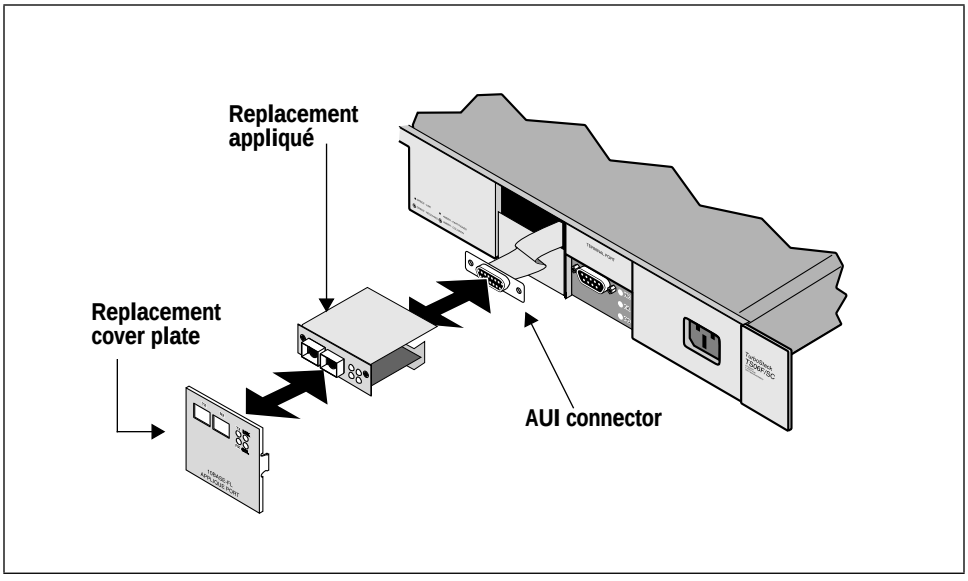

Figure 17: Appliqué Installation

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

3. Secure the interface between the replacement appliqué and the AUI connector by using 4-40 pan-head screws as shown in Figure 18. Note that these screws connect the AUI connector to the back section of the replacement appliqué, which is *not shown* in Figure 18.

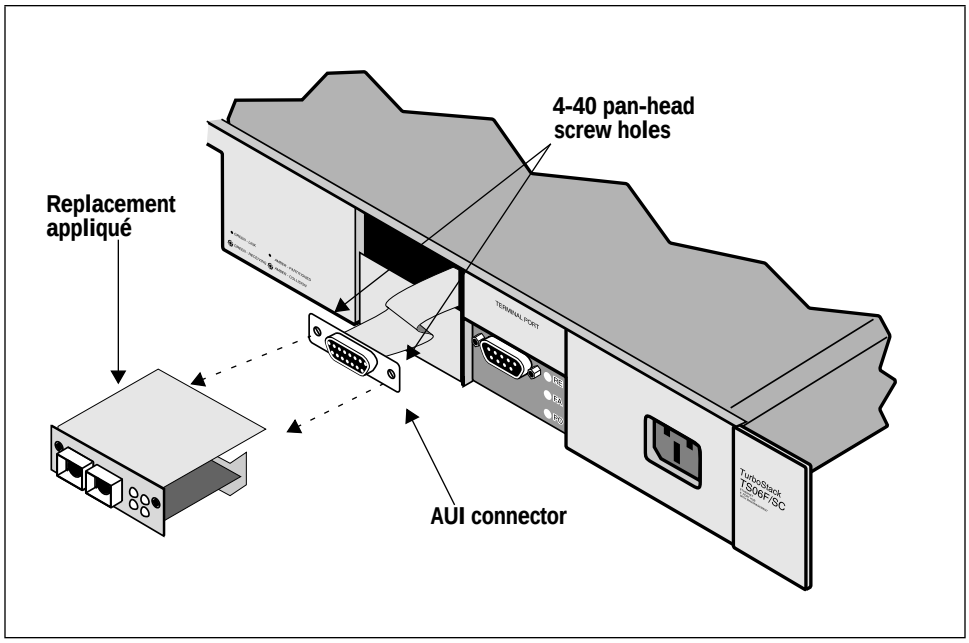

Figure 18: AUI Connector Interface

4. Slide the replacement appliqué into the port cavity and screw it down with the two M3x6 flat-head screws shown in Figure 19. Do not overtighten.

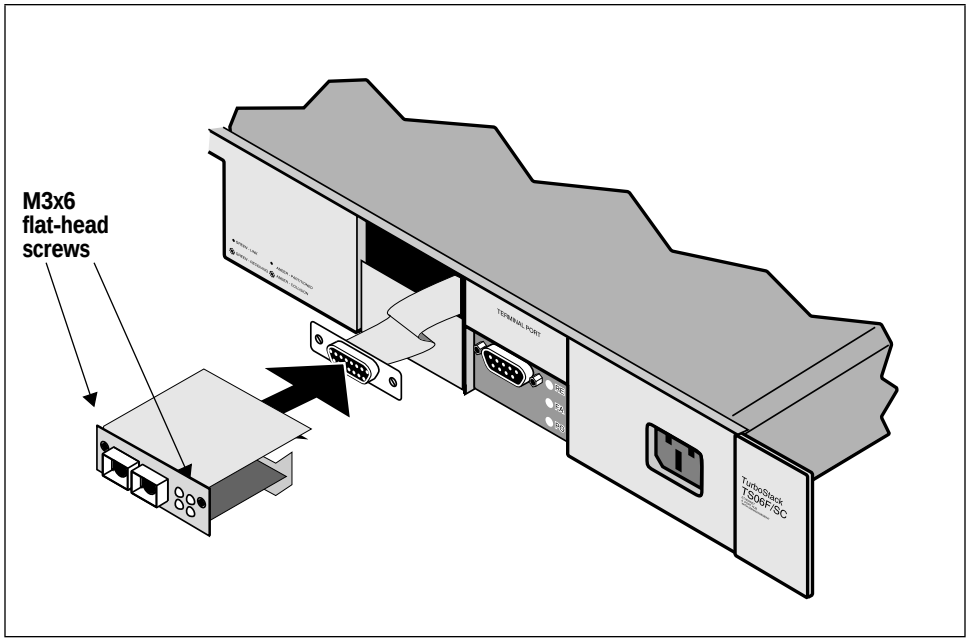

Figure 19: Module Faceplate Interface

5. Snap the corresponding plastic appliqué cover plate in place on the hub faceplate. (See Figure 11 on page 17.)

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

To remove a 10BASE2, 10BASE-T or fiber Optic (10BASE-FL) appliqué

1. Snap off the plastic cover plate on the installed 10BASE2, 10BASE-T, or 10BASE-FL appliqué. (See Figure 11 on page 17.)
2. Remove the two M3x6 flat-head appliqué screws (shown in Figure 19) and pull out the appliqué.
3. Remove the 4-40 pan-head screws from the AUI connector and ribbon cable assembly (reverse of Step 3 and related Figure 18 above).
4. Store the removed 10BASE2, 10BASE-T, or 10BASE-FL appliqué assembly in a secure container for future use.

To install an AUI appliqué

1. Using the supplied screws, lock washers, and nuts, attach the AUI appliqué connector plate and locking bracket (slide-kit) to the AUI connector. (See Figure 14 on page 20.)
2. Using the two M3x6 flat-head appliqué screws, attach the AUI appliqué to the hub faceplate. (See Figure 13 on page 20.)
3. Snap the AT-TSA5 (AUI) plastic cover plate in place on the hub faceplate. (See Figure 11 on page 17.)

Back-panel Features

All TurboStack hubs with management capability have the same back panel layout and features, shown in Figure 20.

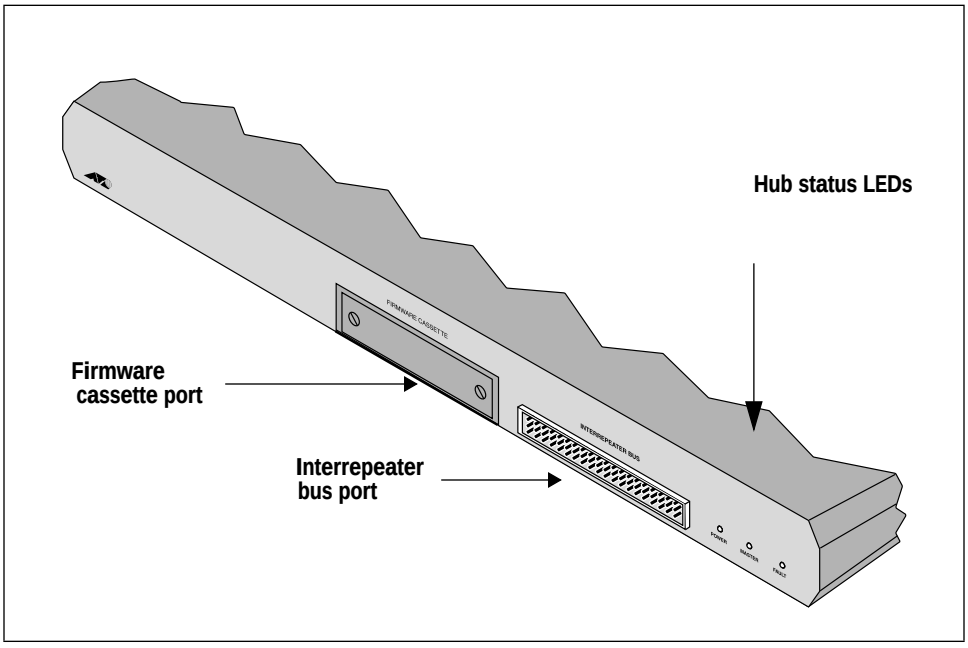

Figure 20: TurboStack Hub Back Panel

- Firmware cassette port used to install new network management software. (For more information, refer to*TurboStack™ AT-S10 Firmware Module for TurboStack Hubs Operations Manual)*
- Interrepeater bus connector that attaches the TurboStack module to the backplane bus in a concentrator chassis
- Status indicators providing information on the hub as a whole. For convenience, these LEDs appear on both the front and back panels.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

LED Displays

TurboStack hubs have two types of LED displays:

- Hub status indicators show the overall condition of the module
- Port activity indicators show the condition of each port connection. Port activity indicator designs vary with module type; later chapters of this manual give specifics.

Hub Status Indicators

As Figure 20 and Figure 21 show, hub status LEDs appear on both the back and the front panels of a TurboStack hub.

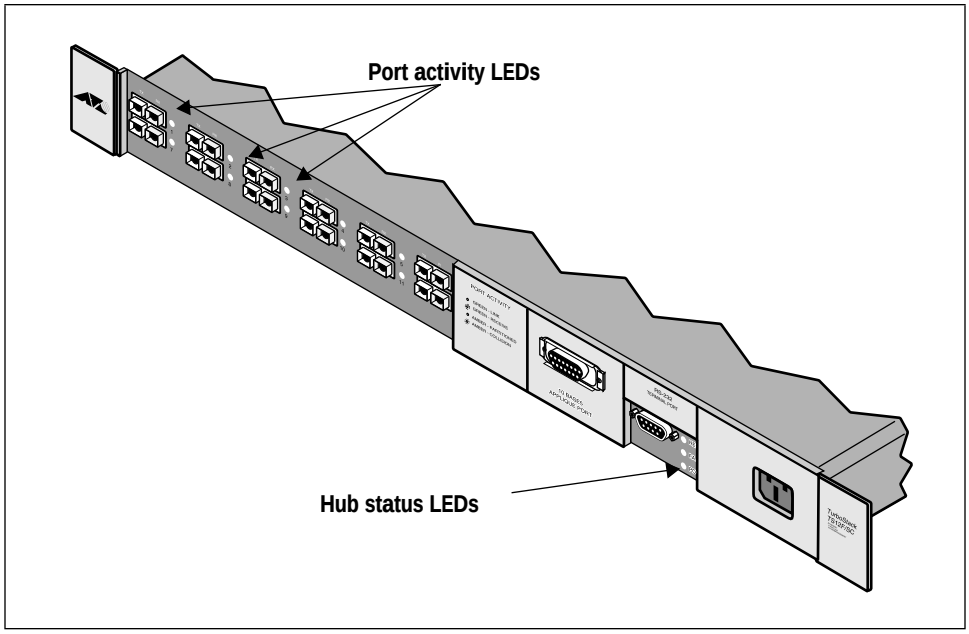

Figure 21: AT-TS12F/SC Hub LED Displays

The specific illumination characteristics of each LED are as follows:

POWER—Green whenever power is applied.

MASTER— Amber indicates the currently active Master. (Illuminates on the Master or on the Backup when the Backup has taken over the Master function).

FAULT—(OFF under normal operational conditions):

- Stays red for a very short time while power-on/reset diagnostics are run; remains continually red if a malfunction occurs during the diagnostics
- Turns red (on a Master only) if the Master fails; if the Backup detects a failure of the Master, the Backup takes over the Master function

Note

If the Master fails, its software may not be able to turn OFF its own Master LED; consequently, the Master LED may be illuminated on two modules in the backplane. In this kind of failure, however, the original Master's Fault LED will also be illuminated to indicate the failure.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Troubleshooting the Installation

This section provides a checklist for resolving problems associated with your hub and cabling. The first rule of troubleshooting is to isolate the problem. As you experiment, only vary one factor at a time. Substitute known good equipment and see if the problem persists or is eliminated.

As a preliminary check, perform the following steps

1. **Do not overlook the obvious**—check diagnostic LEDs and make sure the cables and connectors are securely attached.
2. **If there is no power indication**, check to be sure the power plug is properly seated at the repeater and at the AC receptacle.
3. (UTP models only) **If the UTP Link indicator does not illuminate**, make sure the cabling is intact and connected to a functioning port on the network. Check the cable configuration to make sure the connectors are wired correctly and a cross-over cable is not necessary (see Appendix A for details).
4. **Use only UTP cable designed for use in 10BASE-T applications.** 10BASE-T wiring lengths should not exceed 100 meters (328 ft.). The wiring should be routed away from devices known to emit electromagnetic interference, such as fluorescent lights, photocopiers, power transformers and relay equipment.
5. **If the Link indicator illuminates on a 10BASE-T segment, but data transfer is slow, collision-prone or non-existent**, verify that your UTP cable is of Level 3, 4 or 5. Level 1 and 2 voice-quality cable will not work properly. If the cable is more or less round in section, you probably have data-grade cable. If, however, the cable appears flat (such as “Silver Satin” telephone-type cable), you probably have voice-grade cable which may cause transmission problems. If it looks like telephone cable, double check it. Also, if the wire pairing is incorrect, you may get a Link indication but have high data error rates.
6. **If the Link indicator does not illuminate on a fiber optic segment**, check to be sure the connectors are properly seated and that Receive connects to Transmit on the network device and vice versa. Check to be sure the cable conforms to specification and that the distance has not been exceeded.
7. **If data transfer is slow, collision-prone or non-existent on a 10BASE2 (BNC) port**, make sure the segment is properly terminated on both ends and that there is no other termination between these two points. Also make sure the Terminator Switch is set correctly (see Chapter 4).
8. **If too many collisions are present on an AUI connection**, check to ensure that the external Ethernet transceiver connected to the AUI port has the SQE Test (Heartbeat) function disabled. Excessive network loading can also cause excessive collisions.
9. **If a fault occurs** (fault light stays ON), disengage the repeater module from the backplane, unplug and replug the power cord, and reseat the module.
10. **If a fault light illuminates when you first power-up a hub**, you can correct this problem by turning off the power and powering-up a second time or by inserting a firmware cassette in the back-panel port of the unit. If these actions don’t help, you should initiate a Return Material Authorization (RMA) to ATI.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Chapter 3
AT-TS06F/ST, SC, SM Connectivity

AT-TS06F/ST, SC, SM Modules

ATI offers three 6-port fiber optic hubs with management capability. The only physical difference among the three models is the connector attachment type. Table 5 lists the model numbers, port counts, and media connector type for each.

Table 5: AT-TS06F Hubs with Management

Model Number	Port Count	Media/Connector Type
AT-TS06F/ST	6	Fiber Optic (10BASE-FL) with Straight Tip (ST) Connectors
AT-TS06/SC	6	Fiber Optic (10BASE-FL) with Subscriber Channel (SC) Connectors
AT-TS06F/SM	6	Fiber Optic (10BASE-FL) with Sub Miniature Assembly (SMA) Connectors

The ST (Straight Tip) model has attachment points with two pins to connect bayonet-style. The SC (Subscriber Channel) model has a square push-pull mating interface. The SMA (Sub Miniature Assembly) model has a threaded attachment for connection with the module port.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Figure 22, Figure 23 and Figure 24 show faceplates for each of the three types of hub modules.

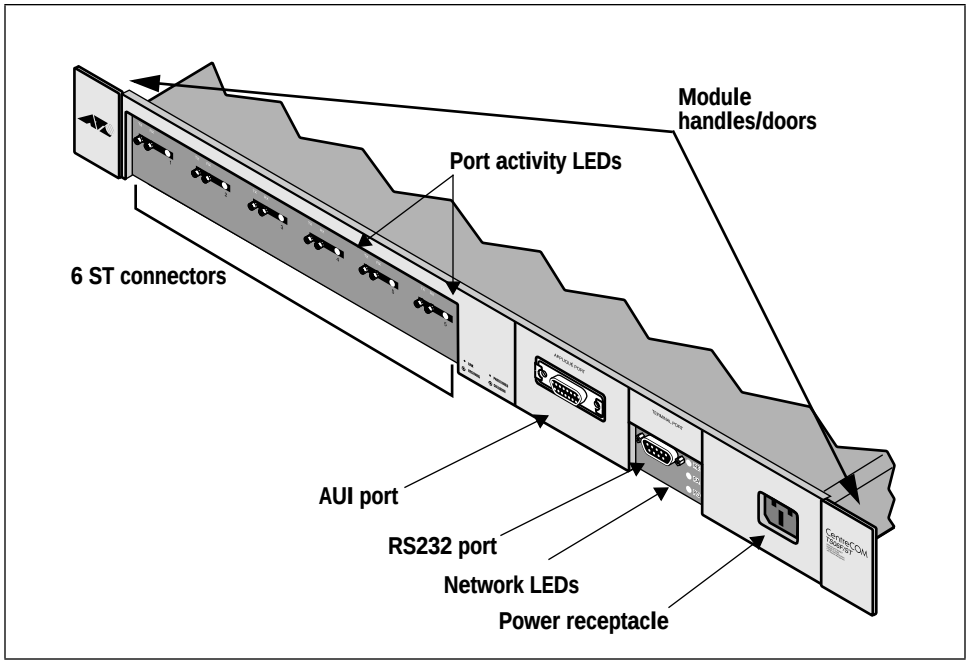

Figure 22: AT-TS06F/ST Faceplate

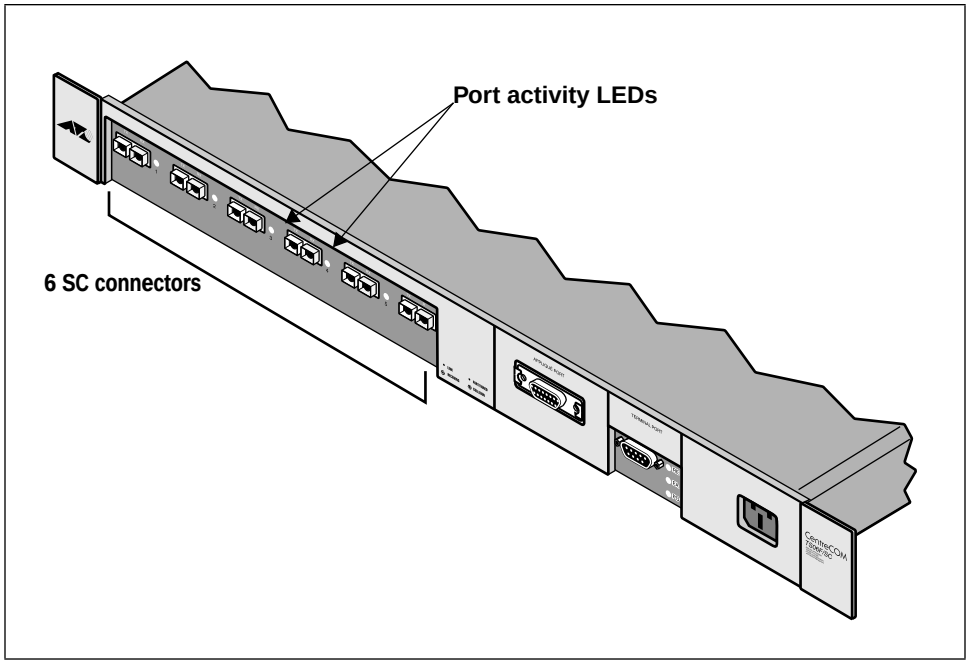

Figure 23: AT-TS06F/SC Faceplate

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

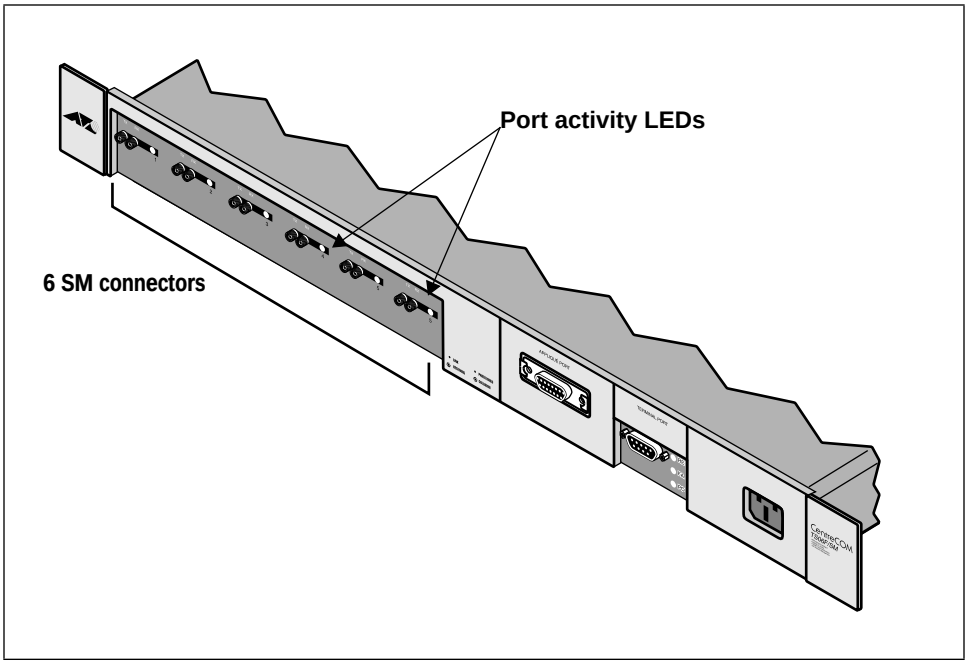

Figure 24: AT-TS06F/SM Faceplate

Note

References in this manual to SMA and SM are interchangeable, both being acronyms for Sub Miniature Assembly.

Fiber Optic (10BASE-FL) Wiring Specifications

The IEEE 10BASE-FL standard limits a fiber segment length to 2 km (6,560 ft.). Note, however, that this only applies to topologies in which one 10BASE-FL node connects to another 10BASE-FL node. You can intermix 10BASE-FL and FOIRL nodes, but if the cable connects a 10BASE-FL node at one end and a FOIRL node at the other, the limitation would revert to the lesser distance of 1 km (3,280 ft.).

AT-TS06F/ST, SC, and SM hubs support 62.5/125 micron and 50/125 micron duplex optical fiber cable (*duplex* refers to fiber optic cable pairs). Normally, duplex fiber optic cable is labeled TX or TD (transmit) and RX or RD (receive). This means it has a dedicated transmit cable and a dedicated receive cable. You must connect the receiving port (RX or RD) on one device to the transmitting (TX or TD) port on a second device for proper connectivity.

To connect a network device to one of the fiber optic ports on the AT-TS06F/ST, SC, SM models:

1. Attach both connectors at one end of the cable to the TX and RX ports on the network device.
2. Connect one of the paired connectors at the other end of the cable to the RX port on the repeater.
3. Check for On Line indicator to illuminate. If it does, connect the other of the pair to TX. If On Line stays off, unplug the connector from RX and use the other of the pair.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Fiber Optic Connectors

Fiber optic repeaters use one pair of ST, one pair of SC, or one pair of SM type connectors per port connection.

If your existing network uses ST and SMA systems, an ST-SMA, ST-SC, or an SMA-SC hybrid cable is commercially available. This cable is a one meter duplex fiber optic cable with an ST, SC, or SMA connector on one end and a different one of the three connector types on the other. It therefore allows easy conversion from one type of connector to the other.

Figure 25 shows the ST (Straight Tip) model whose attachment points connect bayonet-style.

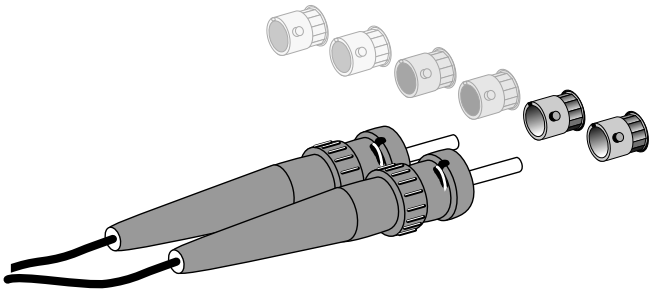

Figure 25: ST Connector for Fiber Optic Cabling

Attention

The ST connector is keyed. Gently rotate the connector to ensure proper mating of the ST plug receptacle. Be careful not to force the connector mating or you might damage the hub's connector.

Figure 26 shows the square push-pull SC connector. Also shown is the optional duplexing clip.

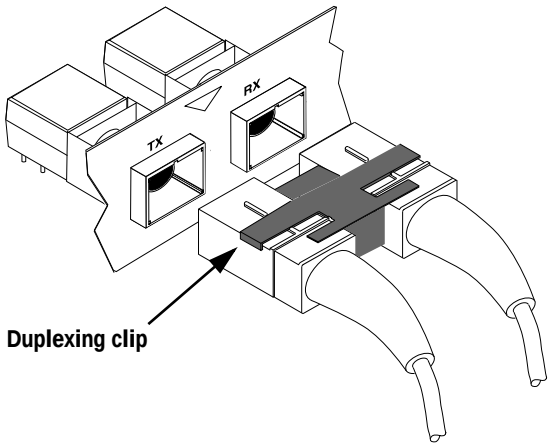

Figure 26: SC Connector for Fiber Optic Cabling

Attention

The SC connector may be installed with an optional duplexing clip, as shown in Figure 26 above. This clip helps prevent confusion between the transmit/receive (TX/RX) left-right sequence when an SC connector is plugged into an SC plug receptacle.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Figure 27 shows the threaded SM connectors.

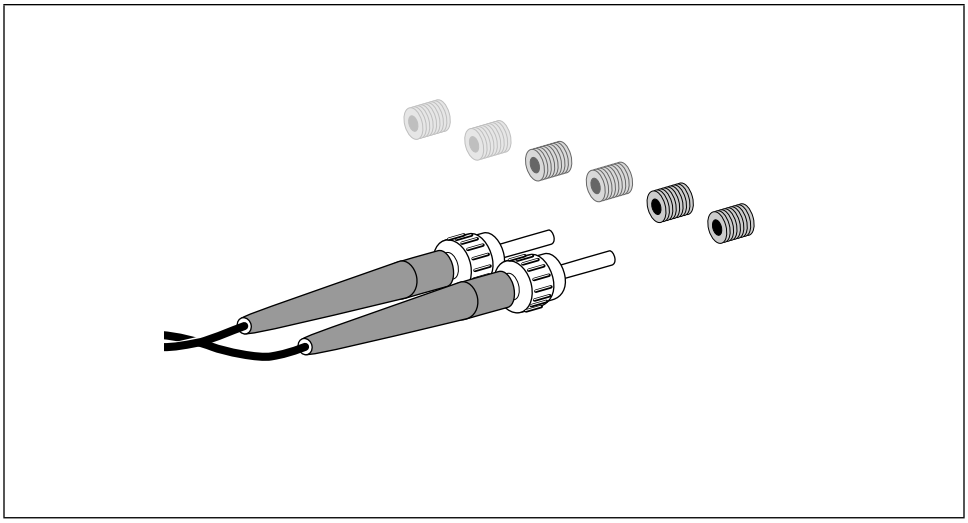

Figure 27: SM Connector for Fiber Optic Cabling

Port Indicators

The port indicators on the AT-TS06F/ST, SC, SM Series repeater front panels provide visual diagnostic and activity information for network analysis, as shown in Figure 28.

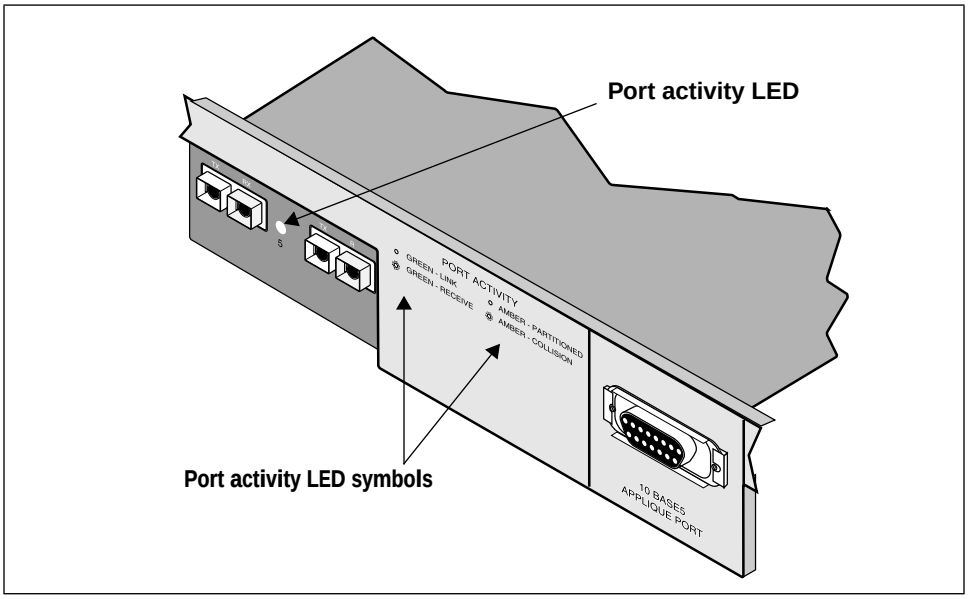

Figure 28: AT-TS06F/SC Port Activity LEDs

Each fiber optic port supports the following indicator functions with one dual-color front panel LED per port.

GREEN LINK—Steady illumination indicates that the port has a valid link and is not partitioned.

GREEN RECEIVE—Flashing illumination indicates that the port has a valid link, is not partitioned, and is receiving data.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

AMBER PARTITION—Steady illumination indicates that the port has a valid link and is partitioned.

AMBER COLLISION—Flashing illumination indicates that the port has a valid link and that there are collisions on the port.

NO LIGHT—This indicates that the port is not functioning.

If you fail to get a link light at a particular port, one or more of the following conditions may be occurring:

1. Network device at other end is turned OFF (transmitter is inactive).
2. Cable is damaged or broken, or attenuation is too high (i.e., too little light is being received because the cable is too long).
3. RX Port has failed.
4. The cabling is incorrect. The RX Port is not connected to TX at the other end, and you need to reverse the connectors.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Chapter 4
AT-TS08 Connectivity

AT-TS08 Modules

The AT-TS08 SNMP-managed hub has eight 10BASE2 ports with BNC connectors. Figure 29 shows the AT-TS08 faceplate; the following sections describe the connectors in detail.

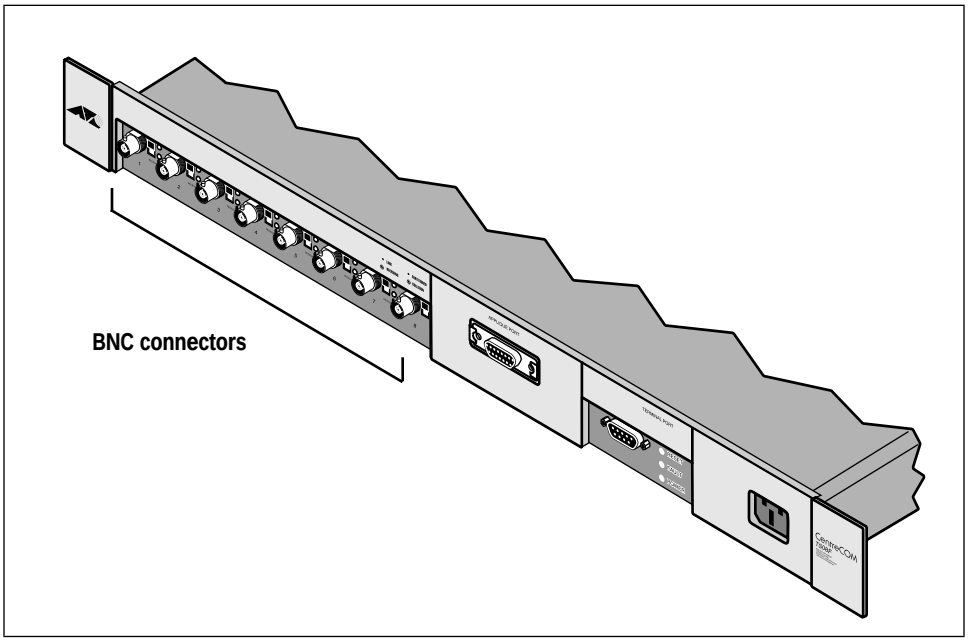

Figure 29: AT-TS08 Faceplate

Ports 1 through 7 are standard 10BASE2 network ports, suitable for connecting workstations or other network devices via 10BASE2 segments.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Normal Cascade

Port 8 is a dual-purpose port and has the label “NORMAL/CASCADE.” You can use it in the following ways:

- ❑ To connect a network device, as you would any of the other ports
- ❑ To extend the network to another hub via a link segment. If you use Port 8 as a cascade port, you may connect the other end of the link segment to Port 1 or any other standard 10BASE2 port, as shown in Figure 30.

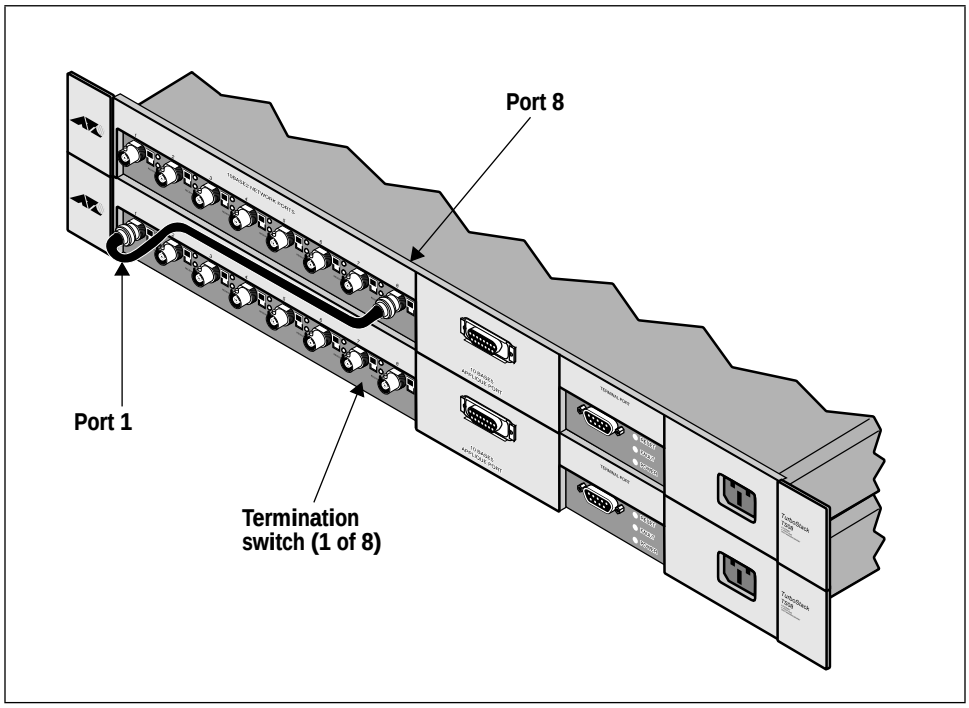

Figure 30: AT-TS08 Cascade connection

10BASE2 Wiring Specifications

10BASE2 (or thinnet) requires a thin coaxial cable, RG58. RG58 is a 10 MHz, baseband cable connected with BNC-series connectors. The cable must be terminated with 50 Ω terminators and grounded at one end. Maximum segment length is 185 meters (606 ft.).

The thinnet coaxial cable is plugged directly into the BNC receptacle for Ports 1 through 8 located on the front panel. Next to each of these ports is the 50 Ω termination switch (see Figure 30). If you are installing a BNC-T connector (like the one shown in Figure 31) in the middle portion of a segment, you must disable the ports’ termination by turning the switch OFF (**0**).

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

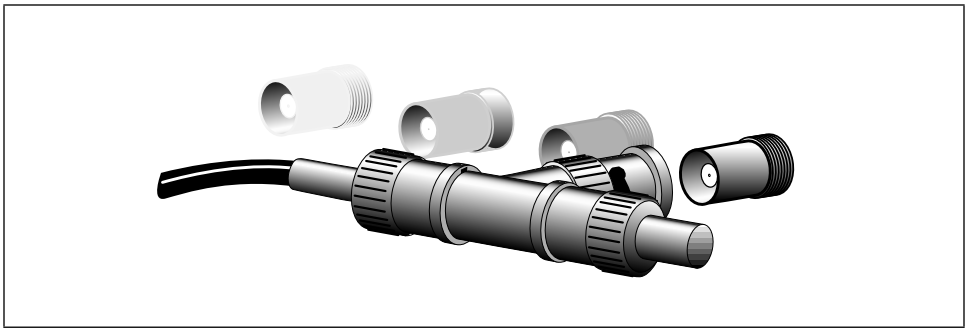

Figure 31: BNC-T at End of 10BASE2 Segment

If you are installing a coaxial cable segment without a BNC-T connector at the end (as shown in Figure 32), you must enable the termination of the port by turning the 50 Ω termination switch ON (**1**).

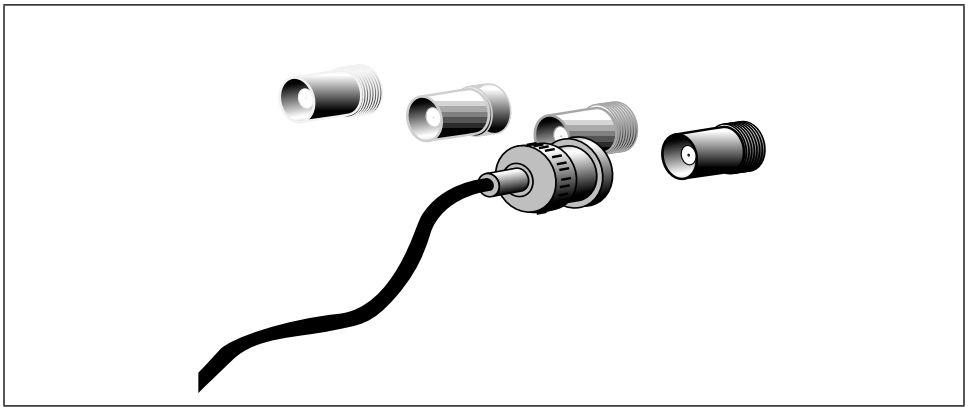

Figure 32: BNC Connector at End of Segment with Internal Termination

Port Status Indicators

The port status indicators on the AT-TS08 hubs' front panels provide visual diagnostic and activity information for network analysis. The indicators are either an individual port LED or a central indicator for box level monitoring.

AT-TS08 Port Indicators

Each 10BASE2 port supports the following indicator functions with two single-color front panel LEDs per port, shown in Figure 33 below:

ON LINE (Steady Green)— Indicates that the port is not partitioned.

RECEIVE (Flashing Amber)— Indicates that the port is receiving Ethernet packets.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

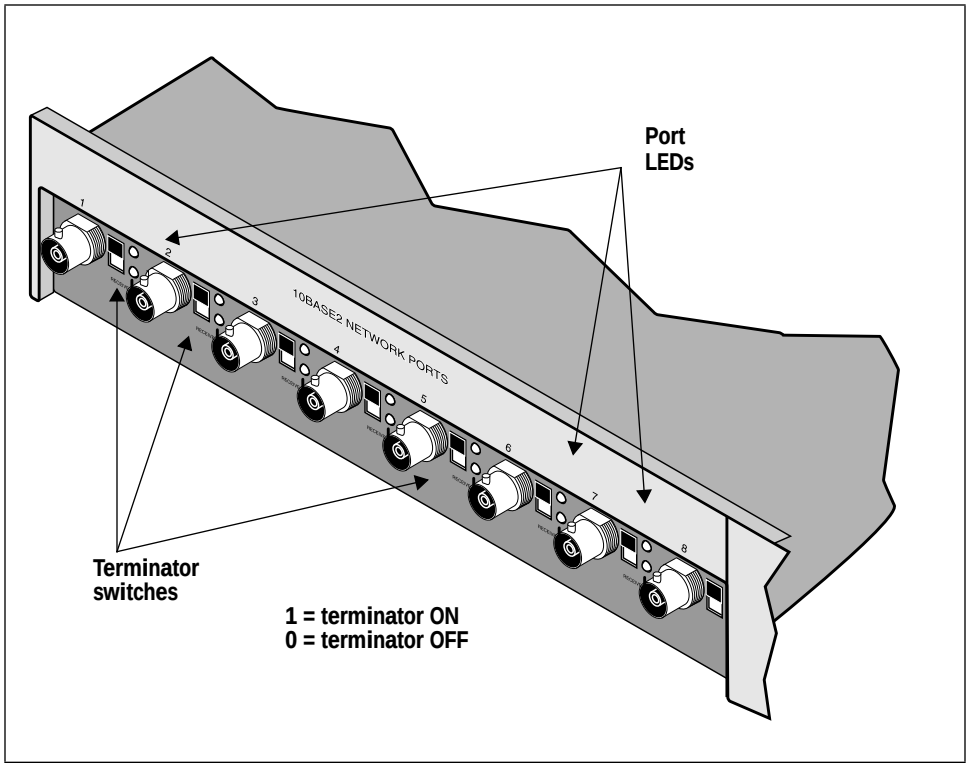

Figure 33: AT-TS08 Port Indicators

Terminator Switch

Figure 33 shows the location of the 50 Ω Terminator switch included with each BNC port receptacle:

0 = Terminator disabled—Use the OFF position if you are installing a coaxial cable segment with a BNC-T connector on this port (see Figure 31).

1 = Terminator enabled—Use the ON position if you are installing a coaxial cable segment without a BNC-T connector at this port and the unit is at the end of the cable (see Figure 31). This is the default switch position.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Chapter 5
AT-TS12F/ST, SC, SM Connectivity

AT-TS12F/ST, SC, SM Modules

ATI offers three fiber optic managed hubs, each with twelve ports. The only physical difference among the three models is the connector attachment type. Table 6 lists the model numbers, port counts, and media connector type for each.

Table 6: AT-TS12F Series Hubs with Management

Model Number	Port Count	Media/Connector Type
AT-TS12F/ST	12	Fiber Optic (10BASE-FL) with Straight Tip (ST) Connectors
AT-TS12F/SC	12	Fiber Optic (10BASE-FL) with Subscriber Channel (SC) Connectors
AT-TS12F/SM	12	Fiber Optic (10BASE-FL) with Sub Miniature Assembly (SMA) Connectors

The ST (Straight Tip) model has attachment points with two pins to connect bayonet-style. The SC (Subscriber Channel) model has a square push-pull mating interface. The SM (Sub Miniature Assembly) model has a threaded attachment for connection with the module port.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Figure 34, Figure 35 and Figure 36 show faceplates for each of the three types of hub modules.

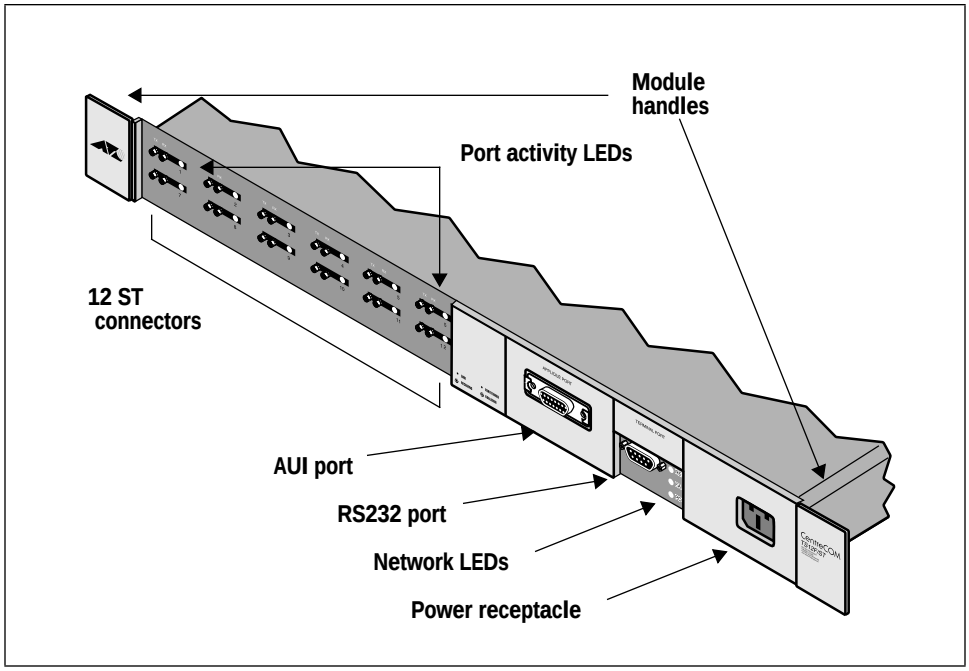

Figure 34: AT-TS12F/ST Faceplate

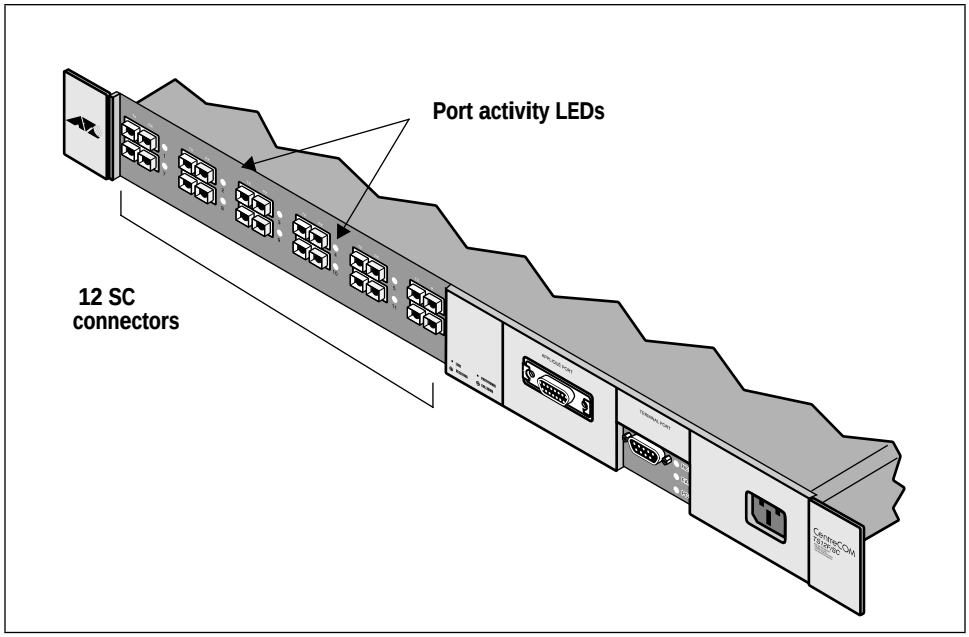

Figure 35: AT-TS12F/SC Faceplate

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

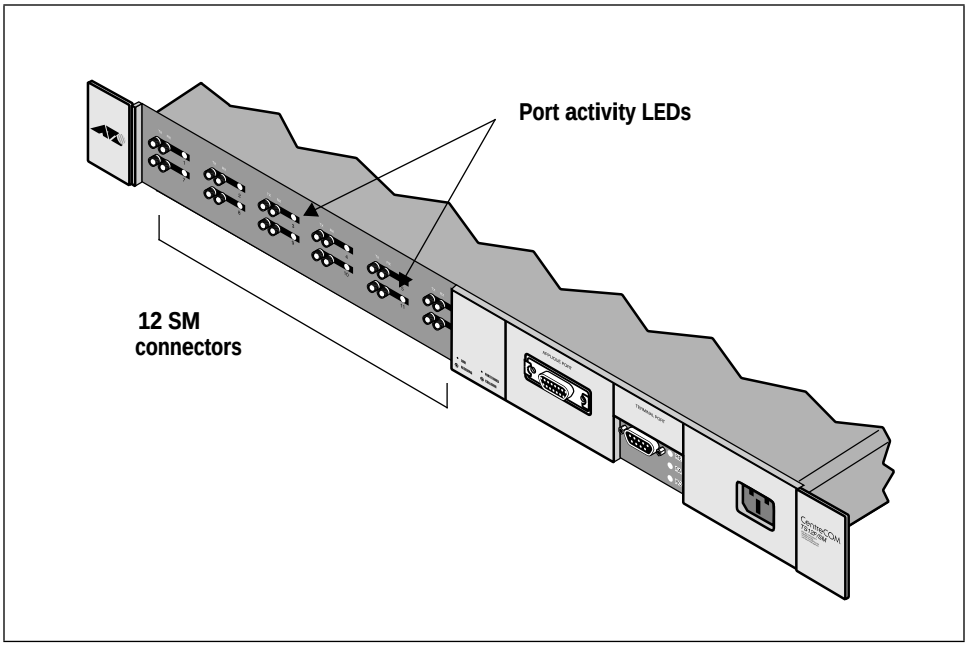

Figure 36: AT-TS12F/SM Faceplate

Note

References in this manual to SMA and SM are interchangeable, both being acronyms for Sub Miniature Assembly.

Fiber Optic (10BASE-FL) Wiring Specifications

The IEEE 10BASE-FL standard limits a fiber segment length to 2 km (6,560 ft.). Note, however, that this only applies to topologies in which one 10BASE-FL node connects to another 10BASE-FL node. You can intermix 10BASE-FL and FOIRL nodes, but if the cable connects a 10BASE-FL node at one end and a FOIRL node at the other, the limitation would revert to the lesser distance of 1 km (3,280 ft.).

AT-TS12F/ST, SC, and SM hubs support 62.5/125 micron and 50/125 micron duplex optical fiber cable (*duplex* refers to fiber optic cable pairs). Normally, duplex fiber optic cable is labeled TX or TD (transmit) and RX or RD (receive). This means it has a dedicated transmit cable and a dedicated receive cable. You must connect the receiving port (RX or RD) on one device to the transmitting (TX or TD) port on a second device for proper connectivity.

To connect a network device to one of the fiber optic ports on the AT-TS12F/ST, SC, SM models:

1. Attach both connectors at one end of the cable to the TX and RX ports on the network device.
2. Connect one of the paired connectors at the other end of the cable to the RX port on the repeater.
3. Check for On Line indicator to illuminate. If it does, connect the other of the pair to TX. If On Line stays off, unplug the connector from RX and use the other of the pair.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Fiber Optic Connectors

Fiber optic repeaters use one pair of ST, one pair of SC, or one pair of SM type connectors per port connection.

If your existing network uses ST and SMA systems, an ST-SMA, ST-SC, or an SMA-SC hybrid cable is commercially available. This cable is a one-meter duplex fiber optic cable with an ST, SC, or SMA connector on one end and a different one of the three connector types on the other. It therefore allows easy conversion from one type of connector to the other.

Figure 37 shows the ST (Straight Tip) model whose attachment points connect bayonet-style.

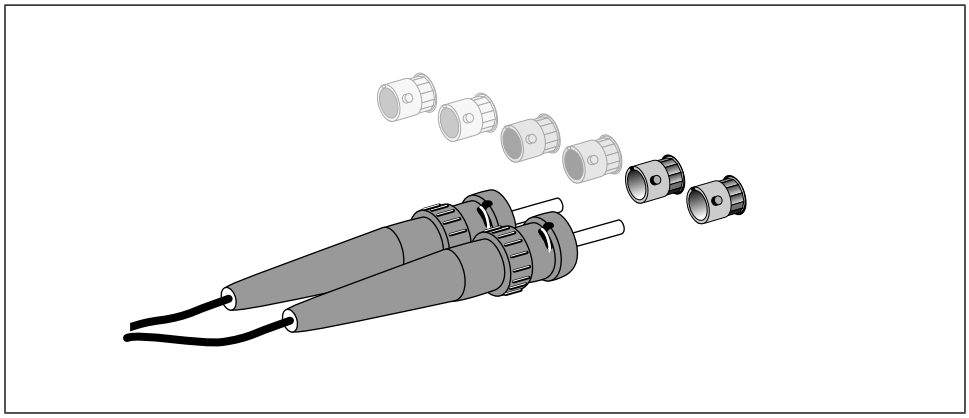

Figure 37: ST Connector for Fiber Optic Cabling

Attention

The ST connector is keyed. Gently rotate the connector to ensure proper mating of the ST plug receptacle. Be careful not to force the connector mating or you might damage the hub's connector.

Figure 38 shows the square push-pull SC connector. Also shown is the optional duplexing clip.

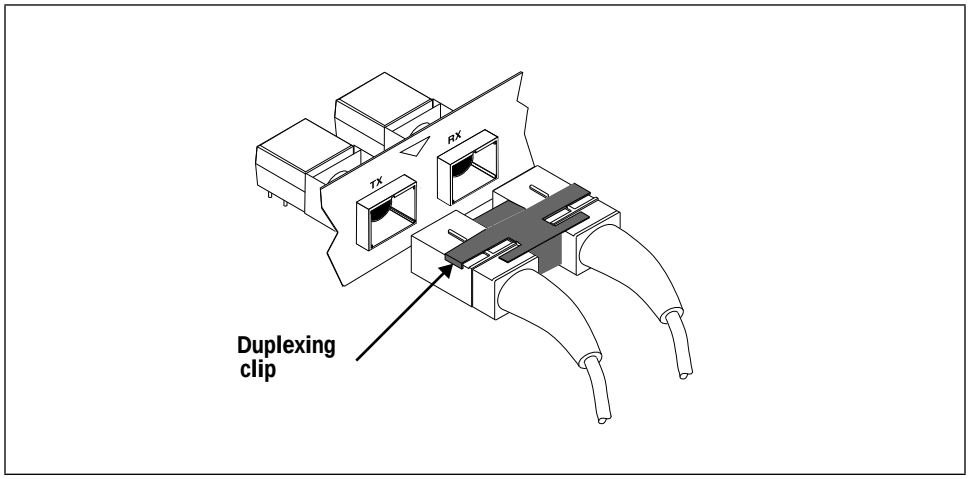

Figure 38: SC Connector for Fiber Optic Cabling

Attention

The SC connector may be installed with an optional duplexing clip, as shown in Figure 38 above. This clip helps prevent confusion between the transmit/receive (TX/RX) left-right sequence when an SC connector is plugged into an SC plug receptacle.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Figure 39 shows the threaded SM connectors.

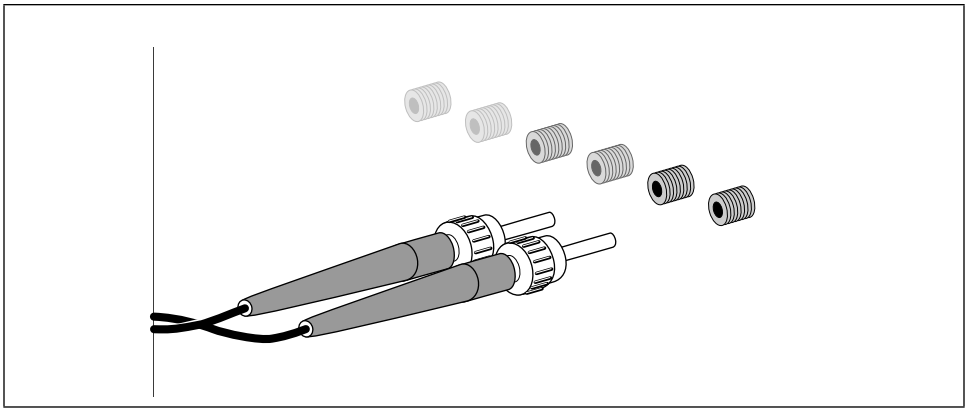

Figure 39: SM Connector for Fiber Optic Cabling

Port Indicators

The port indicators and corresponding symbopls on the AT-TS12F/ST, SC, SM Series repeater front panels provide visual diagnostic and activity information for network analysis (see Figure 40).

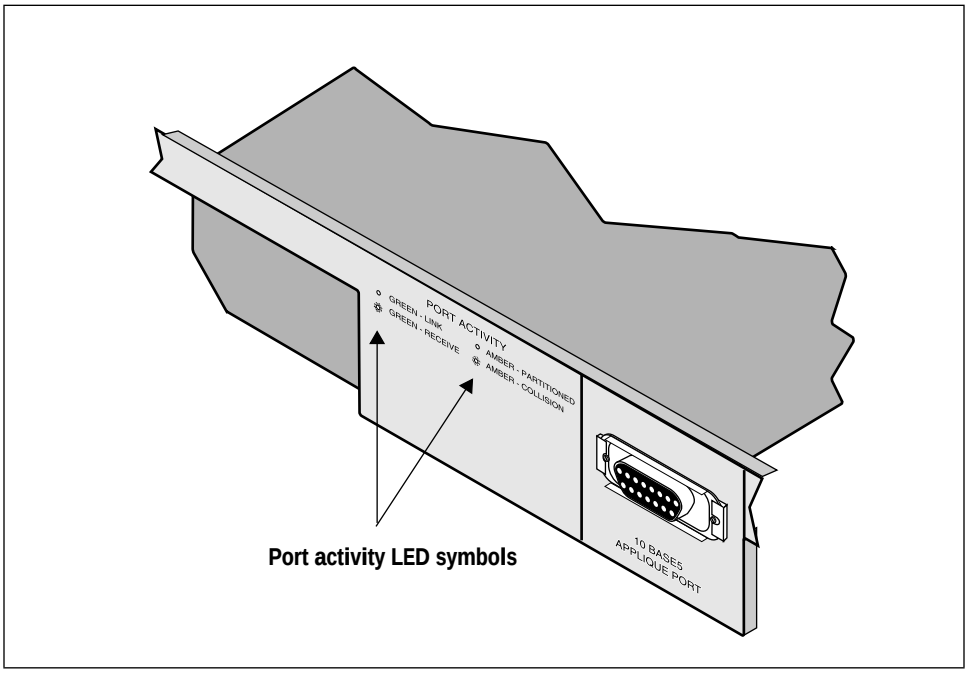

Figure 40: AT-TS12F Port Activity LED symbols

Each fiber optic port supports the following indicator functions with one dual-color front panel LED per port.

GREEN LINK—Steady illumination indicates that the port has a valid link and is not partitioned.

GREEN RECEIVE—Flashing illumination indicates that the port has a valid link, is not partitioned, and is receiving data.

AMBER PARTITION—Steady illumination indicates that the port has a valid link and *is* partitioned.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

AMBER COLLISION—Flashing illumination indicates that the port has a valid link and that there are collisions on the port.

NO LIGHT—This indicates that the port is not functioning.

If you fail to get a link light at a particular port, one or more of the following conditions may be occurring:

1. Network device at other end is turned OFF (transmitter is inactive).
2. Cable is damaged or broken, or attenuation is too high (i.e., too little light is being received because the cable is too long).
3. RX Port has failed.
4. The cabling is incorrect. The RX Port is not connected to TX at the other end, and you need to reverse the connectors.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Chapter 6
AT-TS12T Connectivity

AT-TS12T Modules

The AT-TS12T has 12 10BASE-T ports incorporated in a Telco 50-pin (RJ21) connector for UTP. Figure 41 shows the AT-TS12T faceplate; the following section describes the Telco connector. For general information about UTP wiring, see Appendix A.

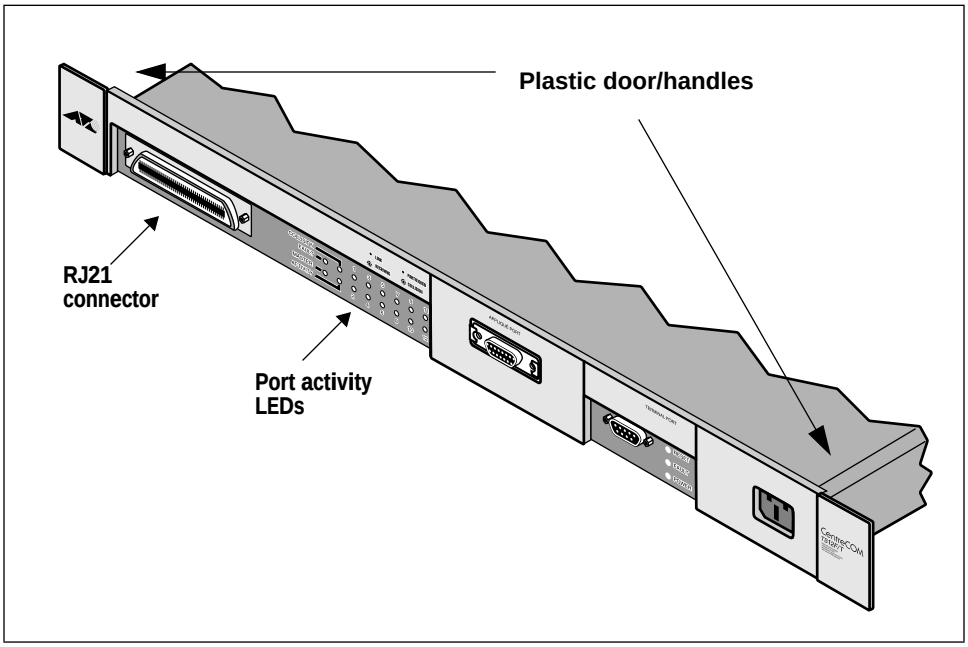

Figure 41: AT-TS12T Faceplate

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

50-Pin Telco Receptacle

The RJ21 50-pin Telco receptacle on the AT-TS12T and AT-TS24T Repeaters is configured as shown in Figure 42.

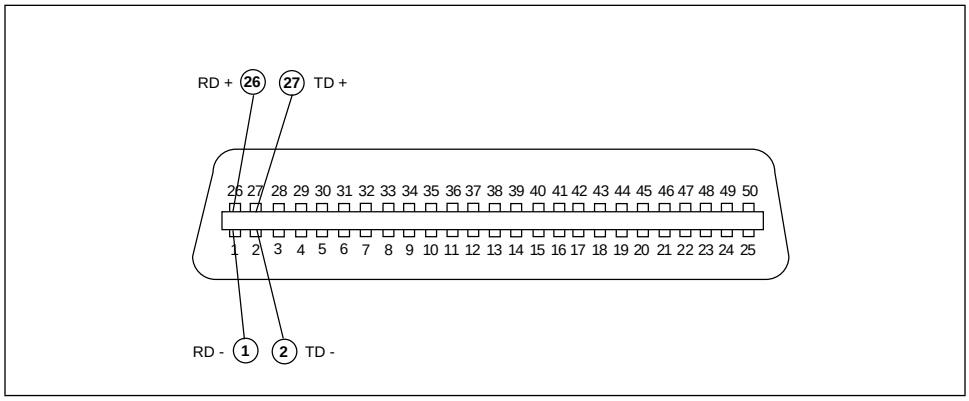

Figure 42: 50-Pin Telco Receptacle

For a pin-out table and information on attachment accessories, see Appendix B.

Port Status Indicators

The port indicators on the AT-TS12T front panel provides visual diagnostic and activity information for network analysis. The AT-TS12T has a central bank of indicators, as shown in Figure 43.

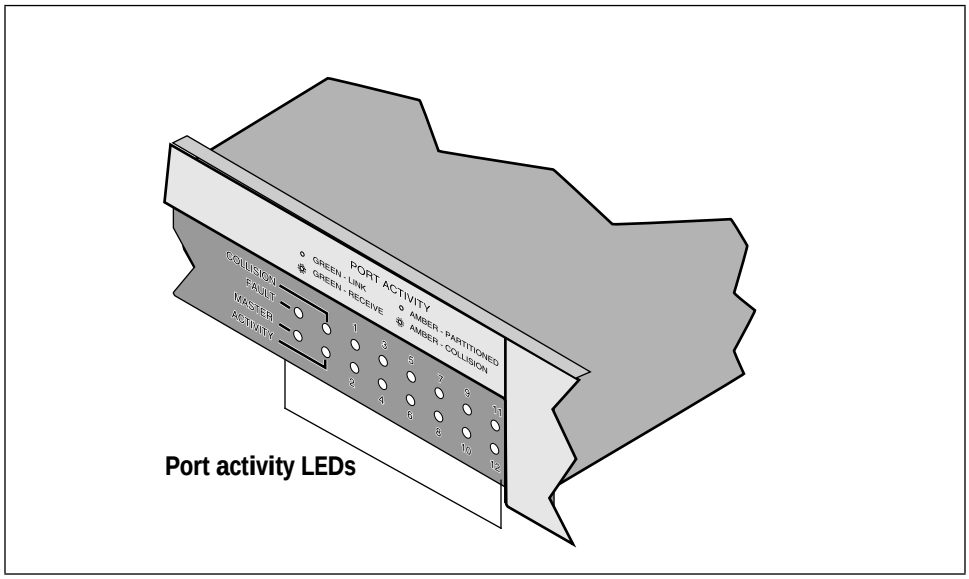

Figure 43: AT-TS12T Port LEDs

Each 10BASE-T port supports the following indicator functions with one dual-color front panel LED per port.

Note

The LEDs do not reflect real-time activity because a data packet is too fast for the human eye to distinguish on the LED indicator; therefore, the hub artificially stretches the LED ON time for easier observation.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

GREEN LINK (Steady Green)—This indicates that the particular port has a valid link and is not partitioned.

GREEN RECEIVE (Flashing Green)—When a port's LED is blinking, the port is receiving Ethernet packets.

AMBER PARTITION (Steady Amber)—A steady amber port indicator means the port is partitioned or segmented from the rest of the ports. This partitioning may be associated with a management function or with an error condition on the link.

AMBER COLLISION (Flashing Amber)—A momentary amber flash occurs when a collision is detected on the port.

NO LINK (No Light)—If the Link Test function is not met by the 10BASE-T device at the opposite end of the UTP segment, this LED will not illuminate. This may occur if the workstation at the end of the segment is turned off or if the UTP segment is disrupted or damaged.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Chapter 7
AT-TS12TR Connectivity

AT-TS12TR Modules

The AT-TS12TR has 12 10BASE-T ports represented by 12 RJ45 connectors for UTP. Figure 44 shows the AT-TS12TR faceplate; the following section describes the connectors. For information about UTP wiring, refer to Appendix A.

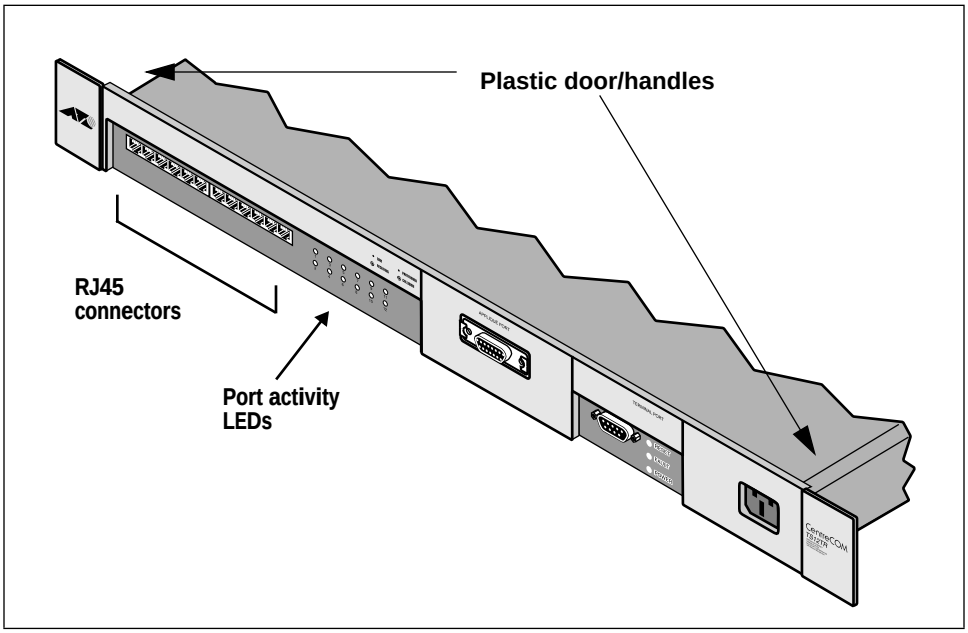

Figure 44: AT-TS12TR Faceplate

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

RJ45 Connectors

The AT-TS12TR uses 12 RJ45 connectors, thus eliminating the need for a Telco-type cabling adapter. Figure 45 shows a sample RJ45 connector.

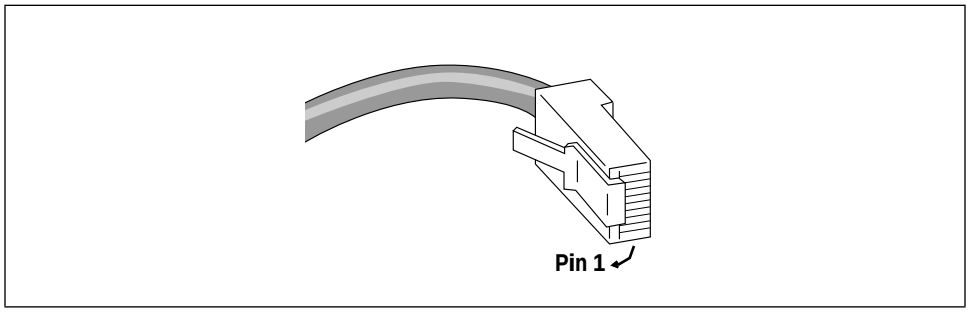

Figure 45: RJ45 Connector

Port Indicators

The port indicators on the AT-TurboStack hub front panels provide visual diagnostic and activity information for network analysis. The AT-TS12TR provides a central bank of indicators for box-level monitoring.

As shown in Figure 46, each 10BASE-T port supports the following indicator functions with one single-color front panel LED per port:

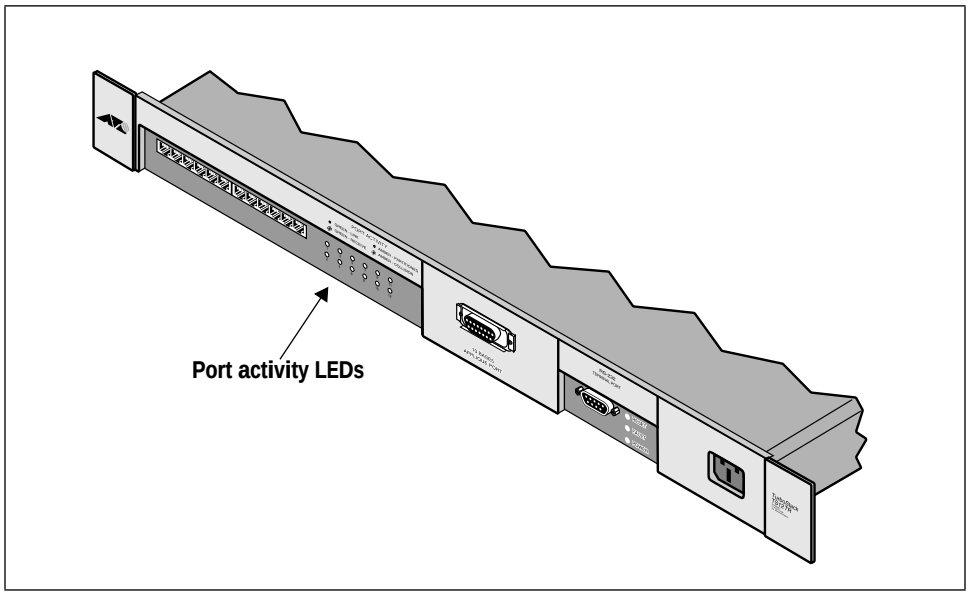

Figure 46: AT-TS12TR Port LEDs

GREEN LINK (Steady Green)—This indicates that the particular port has a valid link and is not partitioned.

GREEN RECEIVE (Flashing Green)—When a port's LED is blinking, the port is receiving Ethernet packets.

NO LINK (No Light)—If the Link Test function is not met by the 10BASE-T device at the opposite end of the UTP segment, this LED will not illuminate. This may occur if the workstation at the end of the segment is turned OFF or if the UTP segment is disrupted or damaged.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Chapter 8
AT-TS24T Connectivity

AT-TS24T Modules

The AT-TS24T has 24 10BASE-T ports incorporated in two Telco 50-pin (RJ21) receptacles for UTP. Figure 47 shows the AT-TS24T faceplate; the following section describes the Telco receptacle. For general information about UTP wiring, see Appendix A.

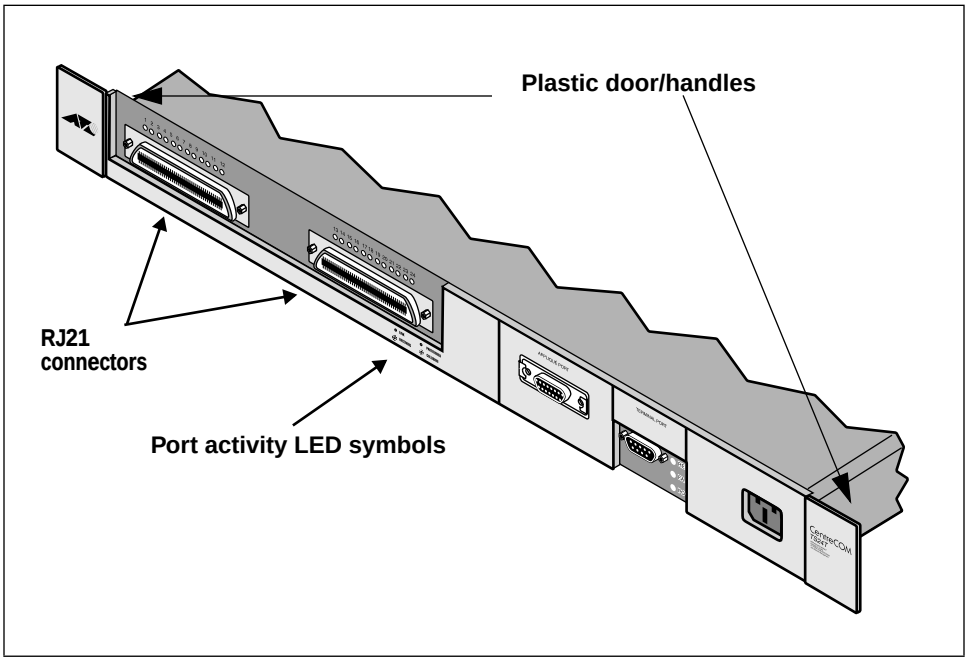

Figure 47: AT-TS24T Faceplate

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

50-Pin Telco Receptacle

The 50-pin Telco receptacles on the AT-TS24T hub are configured as shown in Figure 48.

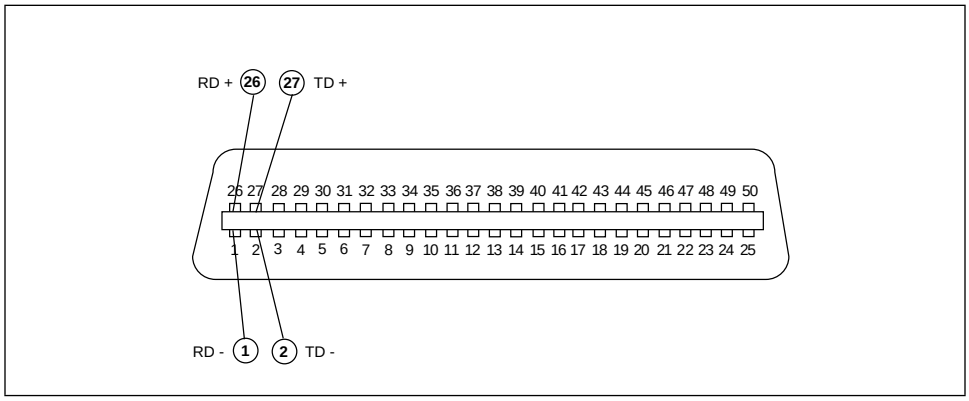

Figure 48: 50-Pin Telco Receptacle

For a pin-out table and information on attachment accessories, see Appendix B.

Port Indicators

The port indicators on the AT-TurboStack hub front panels provide visual diagnostic and activity information for network analysis. The AT-TS24T has one dual-color LED corresponding to each numbered port connection, as shown in Figure 49. A central diagnostic key provides a ready reference to the indicator meanings:

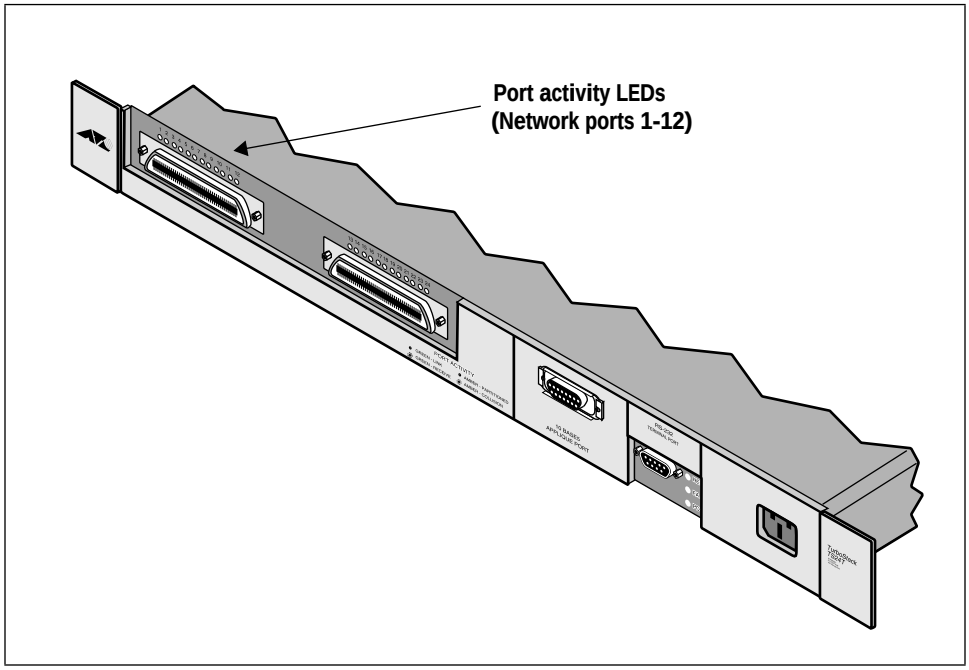

Figure 49: AT-TS24T Port LEDs

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

GREEN LINK (Steady Green)—This indicates that the particular port has a valid link and is not partitioned.

GREEN RECEIVE (Flashing Green)—When a port's LED is blinking, the port is receiving Ethernet packets.

AMBER PARTITION (Steady Amber)—A steady amber port indicator means the port is partitioned or segmented from the rest of the ports. This partitioning may be associated with a management function or with an error condition on the link.

AMBER COLLISION (Flashing Amber)—A momentary amber flash occurs when a collision is detected on the port.

NO LINK (No Light)—If the Link Test function is not met by the 10BASE-T device at the opposite end of the UTP segment, this LED will not illuminate. This may occur if the workstation at the end of the segment is turned off or if the UTP segment is disrupted or damaged.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Chapter 9
AT-TS24TR Connectivity

AT-TS24TR Modules

The AT-TS24TR has 24 10BASE-T ports represented by 24 RJ45 connectors for UTP. The ports are double stacked, in two rows of 12 ports each. Figure 50 shows the AT-TS24TR faceplate; the following section describes the connectors. For information about UTP wiring, refer to Appendix A.

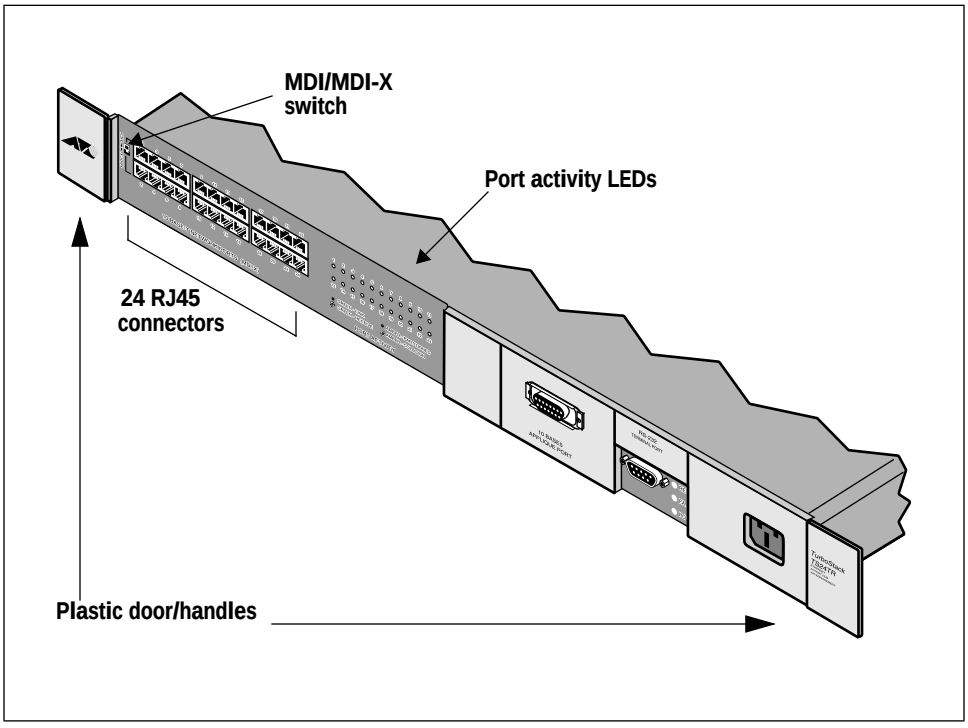

Figure 50: AT-TS24TR Faceplate

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

RJ45 Connectors

The AT-TS24TR uses 24 RJ45 connectors, thus eliminating the need for a Telco-type cabling adapter. Figure 51 shows a sample RJ45 connector.

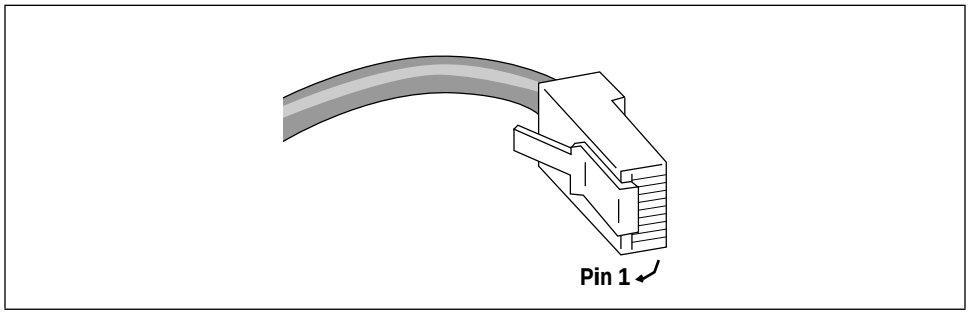

Figure 51: RJ45 Connector

MDI/MDI-X Switch

The 24 10BASE-T RJ45 ports on the AT-TS24TR are generally used for network connections between the hub and a transceiver. Network connections require a standard “straight-through” cable, meaning that a pin at one end connects to a pin with the same number at the other end.

However, you may want to use one of these ports to link one hub to another. This type of connection requires the signal to “crossover,” so that the TX (transmit) pin at one end connects to the RX (receive) pin at the other end. You can accomplish this in either of two ways:

- ❑ You can use a special cross-over cable, available commercially at most electronic outlets; **or...**
- ❑ You can use a built-in method for internally crossing the signal over, before it is transmitted through the cable

ATI has incorporated the latter feature into the AT-TS24TR module (see Figure 52). The Medium Dependent Interface (MDI/MDI-X) switch at the upper left corner of the AT-TS24TR front panel converts RJ45 Port 1 from a normal network connector into an internally crossed-over port for hub-to-hub connection:

- ❑ The default setting for the switch is MDI-X (standard RJ45 port).
- ❑ If you want to use Port 1 to connect two hubs, you must set the switch on one, and only one, of the hubs to the MDI position.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

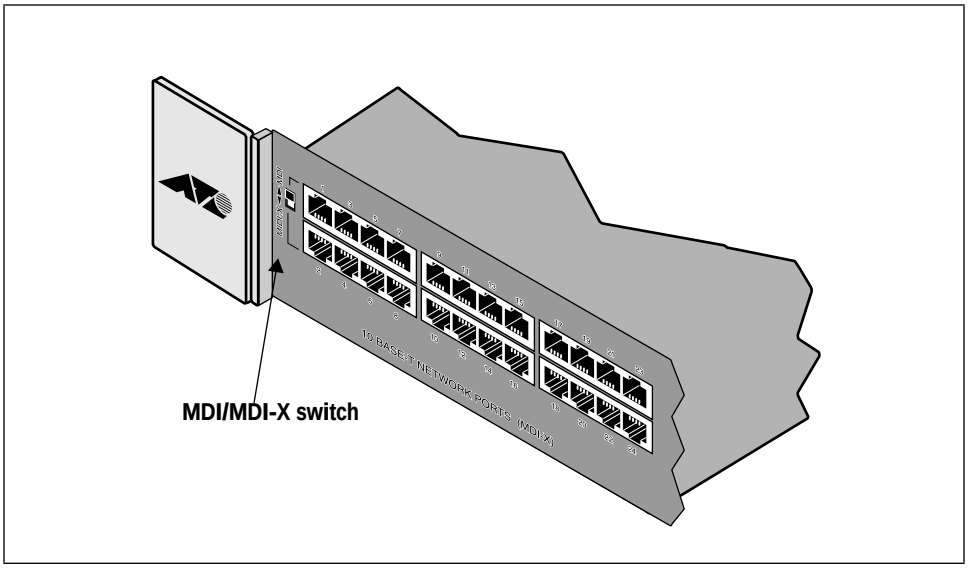

Figure 52: MDI/MDI-X Switch

By setting the MDI/MDI-X switch to MDI, you can connect two hubs via standard straight-through cable. The switch affects Port 1 only; you can continue to use Ports 2 through 24 for network connections via straight-through cable, no matter which way you set the MDI/MDI-X switch.

If you connect a straight-through cable (or any cable for that matter) between two hubs (or any two nodes) and the network, LEDs do not indicate a link condition, you can change the MDI/MDI-X switch. The repeater will not be damaged if the MDI switch is in the wrong position.

Port Indicators

The port indicators on the AT-TS24TR front panel provide visual diagnostic and activity information for network analysis. The AT-TS24TR provides a central bank of indicators for box-level monitoring.

As shown in Figure 53, each 10BASE-T port supports the following indicator functions with one dual-color front panel LED per port:

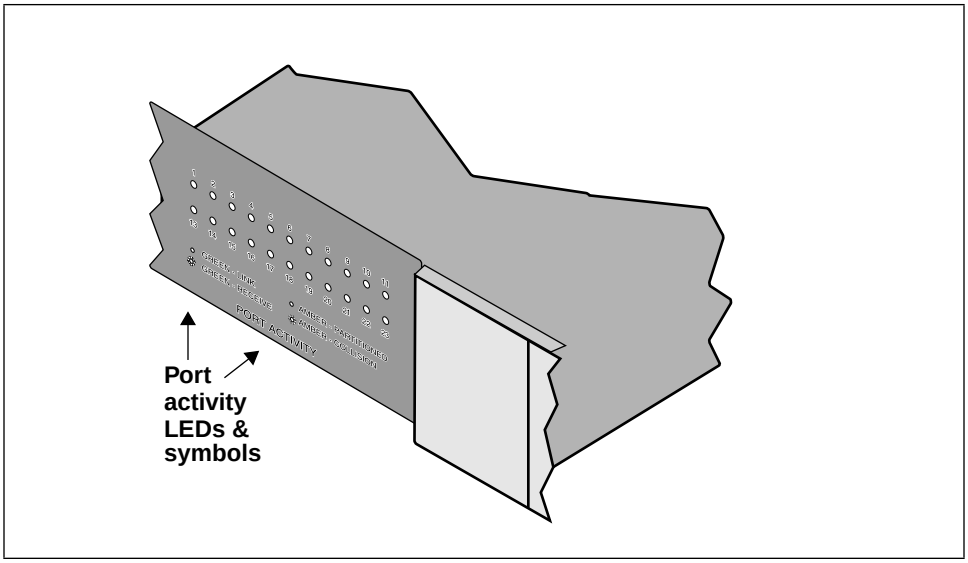

Figure 53: AT-TS24TR Port LEDs

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

GREEN LINK (Solid Green)—This indicates that the particular port has a valid link and is not partitioned.

GREEN RECEIVE (Flashing Green)—When a port's LED is blinking, the port is receiving Ethernet packets.

AMBER PARTITION (Steady Amber)—A steady amber port indicator means the port is partitioned or segmented from the rest of the ports. This partitioning may be associated with a management function or with an error condition on the link.

AMBER COLLISION (Flashing Amber)—A momentary amber flash occurs when a collision is detected on the port.

NO LINK (No Light)—If the Link Test function is not met by the 10BASE-T device at the opposite end of the UTP segment, this LED will not illuminate. This may occur if the workstation at the end of the segment is turned OFF or if the UTP segment is disrupted or damaged.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Appendix A
UTP Reference

UTP Wiring Specifications

10BASE-T requires UTP wiring capable of supporting 10 Megabit data rates. Use Level 3 or better UTP wiring throughout the 10BASE-T wiring system. The wire should be 22 to 26 AWG, 100 Ω impedance with 3 to 8 twists per foot. Typically, if a cable is flat, the pairs are untwisted and will cause problems. A cable more or less round in section is likely to be twisted.

The specifications of 6 common modular cables and their applicability to 10BASE-T network use are shown in Table 7. The maximum length for 10BASE-T UTP segments is 100 meters (328 ft.).

Table 7: Usable and Unusable Twisted Pair Cable

Cable Level	Cable Description	AC Character	Specification	Twist/ Foot	10BASE-T OK?
1	Unshielded untwisted	N/A	CCITT	N/A	NO!
2	Individual UTP	100 Ω ± 30 Ω	RS232 1BASE5 AT&T PDS	N/A	NO!
3	Typical Individual UTP	100 Ω ± 15 Ω	TI, AT&T ISDN 10BASE-T IBM Type 3	3-5	YES
4	Enhanced Individual UTP	100 Ω ± 30 Ω	EIA, TIA 10BASE-T NEMA	5-8	YES
5	Individual STP	100 Ω ± 30 Ω	EIA, TIA 10BASE-T	8-10	YES
IBM Type 1	Individual STP	150 Ω	PCC FT 1	N/A	NO!

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

UTP Hub-to-MAU Wiring

Figure 54 shows a UTP cable with an RJ45 connector. For a 10BASE-T link between a hub and a Medium Attachment Unit (MAU) or Network Interface Controller (NIC), the cable is wired straight-through. That is, an RJ45 receptacle at the hub would wire pin-to-pin to the RJ45 receptacle at the MAU, as shown in Figure 55.

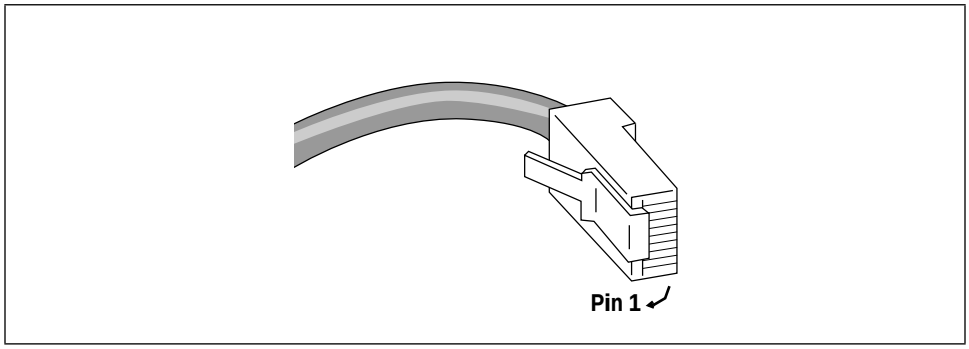

Figure 54: RJ45 Cable

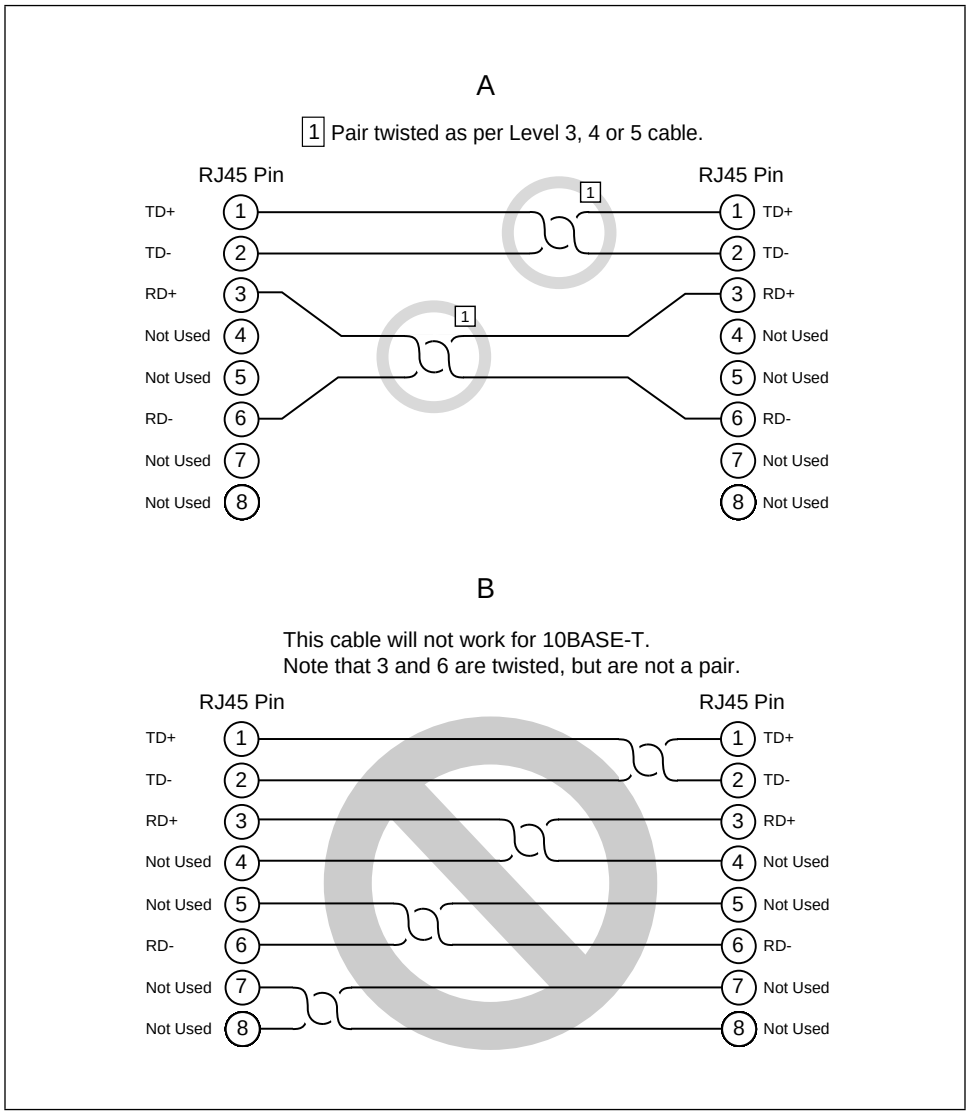

Figure 55: Hub-to-MAU Wiring (A) Usable and (B) Unusable

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

UTP MAU-to-MAU, Hub-to-Hub Wiring

10BASE-T MAU-to-MAU or hub-to-hub wiring generally requires a crossover cable located somewhere along the UTP cable run. This may commonly occur at the punch-down block or between the RJ45 wall receptacle and the workstation. See Figure 56.

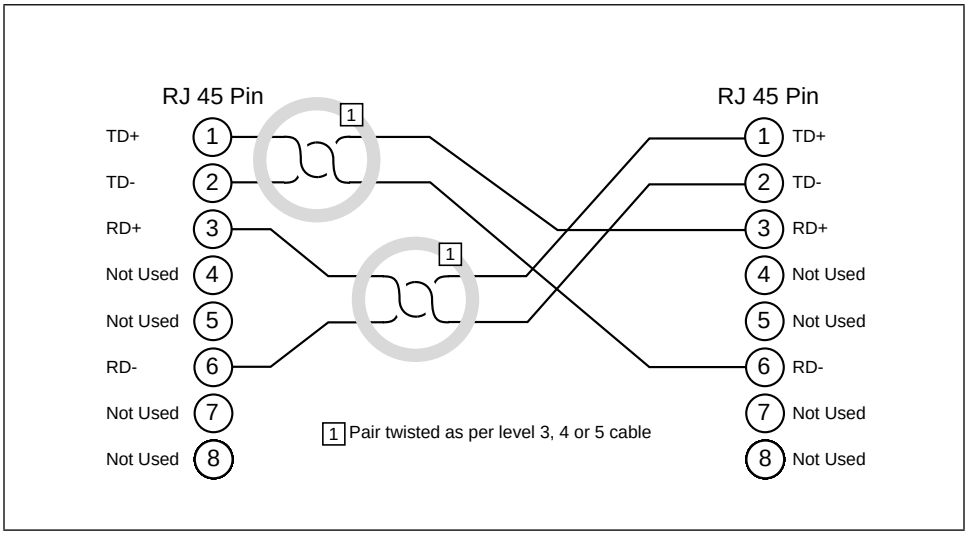

Figure 56: Hub-to-Hub or MAU-to-MAU Wiring

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Appendix B
Telco Reference

Wiring Specification

50-Pin Telco Receptacle

The RJ21 50-pin Telco receptacle on the AT-TS12T and AT-TS24T Repeaters is configured as shown in Figure 57.

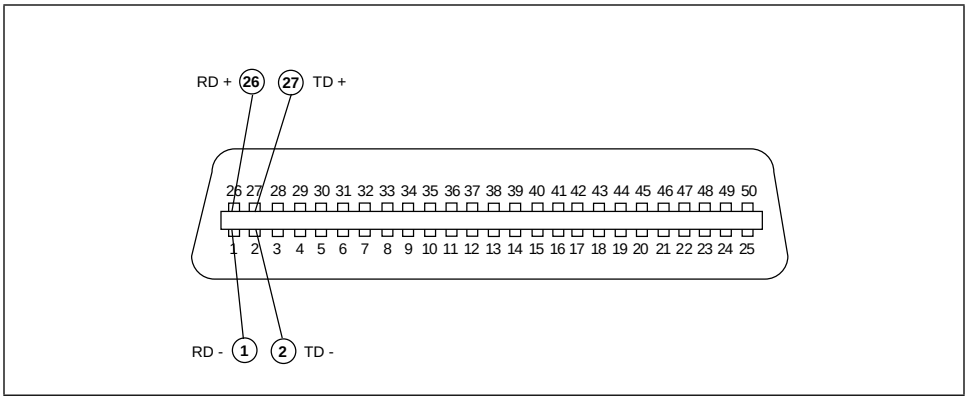

Figure 57: 50-Pin Telco Receptacle

Table 8 on page 62 gives a pin-out chart for the Telco connector.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Table 8: 50-Pin Telco Pin-Out

50-Pin Connector Pin Number	Punch-Down Block Pin Number	Cable Color Code[1]	Link Designation	Hub	8-Pin Modular Jack Pin Numbers
26	1	W-BL	1	RCV POS	1
1	2	BL-W	1	RCV NEG	2
27	3	W-OR	1	XMT POS	3
2	4	OR-W	1	XMT NEG	6
28	5	W-GR	2	RCV POS	1
3	6	GR-W	2	RCV NEG	2
29	7	W-BR	2	XMT POS	3
4	8	BR-W	2	XMT NEG	6
30	9	W0SL	3	RCV POS	1
5	10	SL-W	3	RCV NEG	2
31	11	R-BL	3	XMT POS	3
6	12	BL-R	3	XMT NEG	6
32	13	R-OR	4	RCV POS	1
7	14	OR-R	4	RCV NEG	2
33	15	R-GR	4	XMT POS	3
8	16	GR-R	4	XMT NEG	6
34	17	R-BR	5	RCV POS	1
9	18	BR-R	5	RCV NEG	2
35	19	R-SL	5	XMT POS	3
10	20	SL-R	5	XMT NEG	6
36	21	BK-BL	6	RCV POS	1
11	22	BL-BK	6	RCV NEG	2
37	23	BK-OR	6	XMT POS	3
12	24	OR-BK	6	XMT NEG	6
38	25	BK-GR	7	RCV POS	1
13	26	GR-BK	7	RCV NEG	2
39	27	BK-BR	7	XMT POS	3
14	28	BR-BK	7	XMT NEG	6

NOTE 1. Cable colors may be different from those represented here, depending on the cable manufacturer.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Table 8: 50-Pin Telco Pin-Out (Continued)

50-Pin Connector Pin Number	Punch-Down Block Pin Number	Cable Color Code[1]	Link Designation	Hub	8-Pin Modular Jack Pin Numbers
40	29	BK-SL	8	RCV POS	1
15	30	SL-BK	8	RCV NEG	2
41	31	Y-BL	8	XMT POS	3
16	32	BL-Y	8	XMT NEG	6
42	33	Y-OR	9	RCV POS	1
17	34	OR-Y	9	RCV NEG	2
43	35	Y-GR	9	XMT POS	3
18	36	GR-Y	9	XMT NEG	6
44	37	Y-BR	10	RCV POS	1
19	38	BR-Y	10	RCV NEG	2
45	39	Y-SL	10	XMT POS	3
20	40	SL-Y	10	XMT NEG	6
46	41	V-BL	11	RCV POS	1
21	42	BL-V	11	RCV NEG	2
47	43	V-OR	11	XMT POS	3
22	44	OR-V	11	XMT NEG	6
48	45	V-GR	12	RCV POS	1
23	46	GR-V	12	RCV NEG	2
49	47	V-BR	12	XMT POS	3
24	48	BR-V	12	XMT NEG	6
50	49	V-SL	—	reserved	—
25	50	SL-V	—	reserved	—

NOTE 1. Cable colors may be different from those represented here, depending on the cable manufacturer.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Accessories

50-Pin Telco-to-RJ45 Octopus Cables

The 10BASE-T 'octopus' cable breaks out the AT-TS12T or AT-TS24T Hub 50-pin Telco connector to individual RJ45 connectors. This is an ideal method for connecting into a patch panel in the wiring closet. Patch panels allow for easy configuration and reconfiguration of house wiring requirements.

When you purchase an octopus cable, ensure that it is wired for 10BASE-T and that Level 3 UTP is used. This will help maintain 10 megabit data integrity throughout the wiring system. "Silver Satin" flat cable is out of specification and should not be used.

50-Pin Telco-to-RJ45 Harmonica

Allied Telesyn offers a harmonica adapter, Model AT-ADAPT-2. The harmonica-style adapter shown in Figure 58 allows direct conversion from the 50-pin Telco connector to RJ45 receptacles. There are many different standards for the pin-out of the harmonica adapter. Make sure that the pin-out of the adapter you use complies with the 10BASE-T wiring specification. Refer to Table 8 for the pin-out of the Telco connector for the AT-TS12T if you order a 10BASE-T harmonica adapter from a wiring vendor other than ATI.

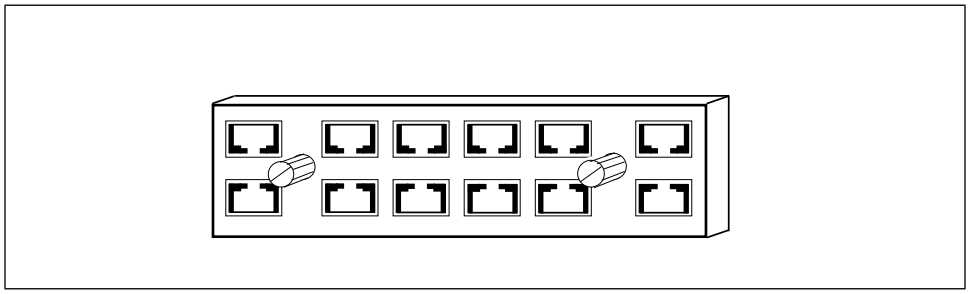

Figure 58: AT-ADAPT-2 Telco-to-RJ45 Harmonica Adapter for AT-TS12T

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Appendix C

IEEE 802.3 Quick Primer

10BASE-T

10BASE-T UTP media were implemented to reduce Ethernet wiring costs. UTP wiring is installed in most buildings for telephone systems. Make sure the UTP wiring used for 10BASE-T is able to carry the high Ethernet data rates before you implement a 10BASE-T network solution.

Unlike coaxial Ethernet, 10BASE2 and 10BASE5, 10BASE-T UTP is point-to-point wiring. Typically, one end is connected to an Ethernet 10BASE-T NIC or transceiver (MAU) and the other end is connected to a 10BASE-T hub (repeater). Straight-through cabling pin-out is used for hub-to-MAU connections. Hub-to-hub and MAU-to-MAU connections are allowed when you use a UTP cable with a crossover function crossing TD+ and TD- with RD+ and RD- signals. No other attachments are allowed along the length of the UTP wire; however, wiring patch panels and punch-down blocks are allowed for interconnecting segments. The cable should be at least Level 3 UTP, 100 Ω impedance, 22 to 26 AWG, and should not exceed 100 meters (328 ft.) in length from one end to the other. See Table 8 on page 62 for comparison of different UTP cables.

Four-Repeater Rule

Up to four repeater units may be connected, for a total of five segments, provided that two of the segments are link segments. Link segments (such as fiber) have no MAU attachments. If all segments are coax segments with MAU attachments, a maximum of two repeater units and three segments is allowed.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

10BASE-FL/FOIRL Ethernet

The IEEE 802.3 10BASE-FL standard supports up to 2,000 meters (6,560 ft.) of multimode duplex fiber optic cable in a point-to-point link which directly attaches two devices. FL is compatible with FOIRL, but FOIRL only supports connections of 1,000 meters (3,280 ft.). Duplex refers to support for fiber optic cable pairs, enabling a two-cable fiber optic connection with transmit mode dedicated to one cable and receive mode to the other. The wide dynamic range of a fiber optic interface facilitates installation. When connecting fiber optic cable, you must connect the receiving pin (RD) to the transmitting pin (TD) and vice versa.

10BASE2 (Thin) Ethernet

When configuring thin coax segments, IEEE 802.3 specifications allow up to 30 MAU attachments per cable segment, spaced at no less than 0.5 meters (1.64 ft.). The 10BASE2 cable length cannot exceed 185 meters (606 ft.) per segment. The worst-case propagation delay for a 185 meter (606 ft.) thin Ethernet segment is 950.9 ns. The propagation delay for thin (10BASE2) Ethernet cable is 5.14 ns/meter. Both ends of the segment must be terminated with a 50 Ω termination with a power rating of 0.5 watts or greater. The segment shield must be earth grounded at only one point on the cable.

10BASE5 (Thick) Ethernet

When configuring 10BASE5 coax segments, IEEE 802.3 specifications allow 100 MAU attachments or less, spaced at multiples of 2.5 meters (8.2 ft.) measured accurately from the cable end (50 Ω terminator included). The 10BASE5 cable segment cannot exceed 500 meters (1640 ft.) in length. Worst-case end-to-end propagation delay of a 10BASE5 coax segment is 2165 ns. Propagation delay of 10BASE5 Ethernet coax is calculated at 4.33 ns/meter. Both ends of the segment must be terminated with a 50 Ω termination with a power rating of 0.5 watts or greater. Earth grounding of the segment shield must take place at only one point on the cable.

AUI Drop Cables

AUI or Drop cables can be no longer than 50 meters (164 ft.) each. Attachments may be made only to the cable ends at the 15-pin D-shell connector. AUI Drop cables may have a maximum 257 ns propagation delay, as used for computing the worst-case propagation delay of a cable system. AUI cable propagation delay is approximately 5.13 ns/meter.

Internally, this cable consists of four shielded twisted-pair wires with an overall shield and drain wire; there is a 15-pin D-shell male connector at one end and a 15-pin D-shell female connector at the other end. Cable impedance is nominally 78 Ω. The AUI cable typically connects a transceiver attached to a coaxial segment with a DTE (workstation).

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Propagation

Propagation delay is the time it takes a signal to travel from the input of a system component to the output; it is usually measured in nanoseconds. IEEE 802.3 has specific propagation delay maximums for the Ethernet components. Cable length plays a major role; i.e., a 50 meters (164 ft.) AUI cable has a maximum propagation delay of 257 ns. The propagation delay of cable depends on the length and velocity factor of the cable type.

Round-trip propagation delay throughout the entire cable system, from farthest ends, may not exceed 51.7 µs, ± 4 µs.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Appendix D
Glossary

10BASE2—Also called thin Ethernet, thinnet or CheaperNet, a 10 MHz baseband specification. Cable impedance is 50 Ω and maximum coaxial segment length is 185 meters (607 ft.).

10BASE5—Also called thick Ethernet, a 10 MHz baseband specification. Cable impedance is 50 Ω and maximum coaxial segment is 500 meters (1,640 ft.). The cable is commonly referred to as yellow cable. Thick Ethernet cable is typically used as a trunk or backbone path for the network.

10BASE-FL—IEEE 802.3 Fiber Optic Ethernet. A fiber optic standard that allows up to 2,000 meters (6,560 ft.) of multimode duplex fiber optic cable in a point-to-point link.

10BASE-T—IEEE 802.3 UTP Ethernet. Low-cost Level 3 or better UTP wiring affords 100 meters (328 ft.) of point-to-point link segments. UTP uses RJ45 connectors and sometimes 50-pin Telco connectors to a patch panel and runs at 10 MHz.

50-PIN TELCO (RJ21)—This connector is very common in 10BASE-T wiring. Unlike the RJ45 connector, the 50-pin Telco connector concentrates up to 12 UTP connections onto one connection. This concentration of UTP ports is then broken out for connection to a punch-down block inside a building's wiring closet. 50-pin Telco connections provide a very clean, uncluttered interface to the building's wiring.

AT-ADAPT-2— A harmonica-style adapter that allows direct conversion from a 50-pin Telco connector to RJ45 receptacles.

ATTACHMENT UNIT INTERFACE (AUI)—Connection between a MAU (transceiver) and a DTE (typically a workstation). Includes a 15-pin D-sub connector and sometimes a 15-conductor twisted pair cable. Maximum length is 50 meters (164 ft.).

BACKUP MODULE— A repeater that behaves as the management module when the Master fails in a department concentrator.

BASEBAND COAXIAL SYSTEM—A system whereby information is directly encoded and impressed on the coaxial transmission medium. At any point on the medium, only one information signal at a time can be present without disruption.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

BAYONET NUT COUPLE (BNC) CONNECTOR—A 10BASE2 thin coax connector with push-on BNC locking lug. This lug quickly locks into place with a half twist.

BIT RATE (BR)—The rate of data throughput on the medium in bits per second. Ethernet specifies 10 million bits per second.

BIT TIME—The duration of one bit symbol (1/BR). Ethernet specifies a bit time of 100 ns.

CARRIER SENSE—In a LAN, an ongoing activity of a data station that detects whether another station is transmitting.

CARRIER SENSE MULTIPLE ACCESS with COLLISION DETECT (CSMA/CD)—This is the access method employed by IEEE 802.3 LAN transceivers, by which multiple stations compete for use of the transmission medium (coax cable) for data packet transmission. It provides for a level of error detection should that transmission be corrupted or impeded by contention for the transmission medium.

COAX SEGMENT—A segment of Ethernet cable that contains MAUs.

COAXIAL CABLE—A two-conductor (center conductor, shield system), concentric, constant-impedance transmission line used as the trunk medium in the baseband system.

COAXIAL CABLE SEGMENT—A length of coaxial cable sections and coaxial connectors, terminated at each end in its characteristic impedance.

COLLISION—An unwanted condition that results from concurrent transmissions on the physical medium.

COMPATIBILITY INTERFACE—The MDI coaxial cable interface and the AUI branch cable interface, the two points at which hardware compatibility is defined to allow connection of independently designed and manufactured components with the baseband transmission system.

CROSSOVER—Wiring used when connecting a 10BASE-T MAU to another 10BASE-T MAU or a 10BASE-T hub to another 10BASE-T hub. For example, one 10BASE-T MAU has the TD pair on the same pins as another 10BASE-T MAU. If pins were wired straight, there would be two transmitters on one pair and no receiver. As a solution, the crossover cable crosses the TD pair with the RD pair, to connect the TD pins on one end to the RD pins at the other end.

D-SUB CONNECTOR—The AUI cable uses 15-pin D-sub connectors. “D” refers to the shape of the connector shell. Also called miniature D, DB15, or DIX connectors.

DATA COMMUNICATION EQUIPMENT (DCE)—In RS-232 specification, a module, such as a modem, for connecting a DTE to other equipment. A repeater connected to a terminal or workstation for Omega management use is wired as a DCE.

DATA TERMINAL EQUIPMENT (DTE)—In RS-232 specification, a module typically at the end of a segment (i.e., uninterrupted length of Ethernet cable). The DTE could be an Ethernet workstation, repeater or bridge.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

DEPARTMENT CONCENTRATOR—Hub that provides a large number of workstation connections. The term department concentrator refers to multiple repeaters housed in an AT-CTS 7-slot or AT-C36C 8-slot chassis. See Hub/ Repeater, Repeater.

DIX CONNECTOR—See D-Sub Connector

FOIRL — A fiber optic standard that allows up to 1,000 meters (3,280 ft.) of multimode duplex fiber optic cable in a point-to-point link.

HARMONICA ADAPTER—This adapter provides a simple way to convert the 50-pin Telco connection to RJ45 connections. See AT-Adapt-2.

HEARTBEAT—See SQE

HOT SWAPPING— The process of replacing a hub module without bringing down the network. This process occurs when you slide an active module into a fully powered-up concentrator, replacing a failed module.

HOUSE WIRING—House wiring is the existing wiring inside a building. This wiring generally originates from one or more wiring closets, such as a telephone room. Some older buildings may have wiring unsuitable for 10 megabit data rates. In these circumstances, it is recommended that the wiring be tested with a 10BASE-T signal/wire tester.

HUB/REPEATER—A hub is a central signal distributor. It is used in a wiring topology consisting of several point-to-point segments originating from a central point. The term hub is often used interchangeably with the term repeater. Multiport 10BASE-T, 10BASE2 and fiber optic (10BASE-FL, FOIRL) repeaters are considered hubs. See Repeater.

HUB-to-HUB WIRING—See MAU-to-MAU Wiring

HUB-to-MAU WIRING—UTP cables for 10BASE-T hub-to-MAU or NIC cards are wired straight-through. An RJ45 receptacle at the hub would wire pin-to-pin to the RJ45 receptacle at the MAU.

IMPEDANCE—An electrical characteristic of a circuit dealing with the combination of the AC and DC resistance and the appearance of that resistance to attached circuits.

JABBER LOCK-UP—The MAU's ability to automatically inhibit the transmit data from reaching the medium if the transmit data time exceeds a specified duration. This duration is in the range of 20 ms to 150 ms. Jabber lock-up protects the medium from being overrun with data packets from a possibly defective device.

JAM—This is a term used to describe the collision reinforcement signal output sent by the repeater to all ports. The jam signal consists of 96 bits of alternating 1s and 0s. Its purpose is to extend a collision sufficiently so that all devices cease transmitting.

JITTER—The shift of the data bit in respect to a standard clock cycle. Jitter is undesirable and must be minimized.

LINK SEGMENT—The link segment of coaxial cable is a segment that has no MAU devices, but links together two LAN devices such as repeaters.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

LINK TEST—In 10BASE-T Ethernet, there is a link test function that validates the UTP link. This consists of a pulse transmitted from point A on one pair that is validated at point B. Point B also transmits a pulse on the second pair to be validated by point A. These pulses occur during media idle states (in between packets).

MANAGED MODULE— An intelligent repeater in a department concentrator chassis that makes management data available to the Master.

MANAGEMENT AGENT—Software that is used to view hub activity and set hub variables.

MASTER—A repeater in the topmost position in a department concentrator chassis that contains and downloads the management agent software to Backup and Slave modules. The Master contains the only active image of the management agent and controls the management functions of the Backup and Slaves.

MAU—See Medium Attachment Unit

MAU-to-MAU, HUB-to-HUB WIRING—10BASE-T MAU-to-MAU or hub-to-hub wiring generally requires a crossover cable located somewhere along the UTP cable run. This may commonly occur at the punch-down block or between the RJ45 wall receptacle and the workstation.

MAU/TRANSCEIVER—An Ethernet transceiver is a MAU. A 10BASE-T MAU interfaces the UTP media to an AUI port on a workstation, repeater, bridge or other Ethernet device.

MDI/MDI-X—See Medium Dependent Interface

MEDIUM ATTACHMENT UNIT (MAU)—In a LAN, a device used in a data station to couple the DTE to the transmission medium.

MEDIUM DEPENDENT INTERFACE (MDI)—The mechanical and electrical interface between a hub and a transceiver (MAU). MDI-X is another version of the interface that enables hubs to connect using different pin-outs, thereby avoiding conflicts that occur when receiving and transmitting packets use the same pin-out.

MODULE—A single repeater when it is mounted with other repeaters in an AT-CTS or AT-C36 department concentrator chassis.

N-SERIES—A barrel-shaped, threaded connector used on 10BASE5 (thick Ethernet) coaxial cable.

PATCH PANEL—A 10BASE-T patch panel may be used between a punch-down block and a UTP workstation. The patch panel generally has a female RJ45 connector on the front for each workstation and a Telco (RJ21) connector on the back; through the RJ21 connector, the patch panel is wired to a punch-down block. This provides a convenient way for the installer or network manager to connect the hub 10BASE-T ports into the desired building locations.

POLARITY CORRECTION—Many 10BASE-T UTP ports have a polarity correction function. If the UTP wiring has RD- and RD+ inadvertently crossed, the polarity correction function will sample the signal and electrically swap the wires. If the TD- and TD+ wires are crossed, the correction would occur at the MAU on the other end of the UTP link. This occurs within a single pair and should not be confused with the crossover cable.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

PROPAGATION DELAY—The time required for a signal to travel from the input of a system component to the output. Usually measured in nanoseconds. IEEE 802.3 stipulates specific propagation delay maximums for computing propagation budgets when you design a LAN. Cable length plays a major role in propagation delay; for example, a 50-meter (164-foot) AUI cable has a maximum allowable propagation delay of 257 ns. The propagation delay of cable depends on the length and velocity factor of the cable type. There are also propagation delays associated with electronics attached to the system.

PUNCH-DOWN BLOCK—The punch-down block is the wiring panel where the house wiring from the building's offices terminates. This is where many 10BASE-T hubs would be located. Wiring installers use a special punch-down tool to insert the UTP wire for data and voice applications.

REPEATER—A device used to extend the length, topology, or interconnectivity of the physical medium beyond that imposed by a single segment, up to the maximum allowable end-to-end trunk transmission line length. Repeaters perform the basic actions of restoring signal amplitude, waveform and timing applied to normal data and collision signals.

RJ45—This connector is a 10BASE-T standard for connecting UTP cabling. It is inexpensive and easy to install onto UTP cable.

SIGNAL QUALITY ERROR (SQE)—Also referred to as Collision or Collision Presence. This occurs when two devices attempt to transmit at the same time, which is an illegal condition. All ATI transceivers test for SQE.

SIMPLE NETWORK MANAGEMENT PROTOCOL (SNMP)— SNMP is a TCP/IP protocol that generally uses the User Datagram Protocol (UDP) to exchange messages between a management information base and a management client residing on a network. Since SNMP does not rely on the underlying communication protocols, it can be made available over other protocols, such as XNS or DECnet.

SLAVE— A repeater that behaves as a "dumb" module managed by a Master in a department concentrator chassis. Slaves operating standalone perform only simple regeneration and retiming tasks associated with repeating and are not manageable.

SQE TEST—Commonly referred to as Heartbeat, is a special 802.3 signal sent by the MAU to the DTE to test the collision detection function. Some DTE want SQE and others do not. Repeaters do not want the SQE Test.

STANDALONE—Repeater operating as a hub on its own; i.e., not a module among other modules in a department concentrator chassis.

STRAIGHT-THROUGH—A type of wiring connection where the pins of one connector interface with the same pins of another connector. For example, pin 1 of one connector connects to pin 1 of another connector.

SUBSCRIBER CHANNEL (SC) CONNECTOR—A type of port connection where the pins connect through a square push-pull mating interface.

SUB MINATURE ASSEMBLY (SMA) CONNECTOR—A type of port connection where the pins connect through a threaded attachment interface. (Also referred to as an *SM Connector*.)

STRAIGHT TIP (ST) CONNECTOR—A type of port connection where the pins connect through a bayonet-style interface.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

TCP/IP PROTOCOLS—A set of protocols for intercomputer communication, including network level (Internet Protocol), transport level (Transmission Control Protocol or TCP) and application level protocols (for example, Telnet terminal emulation). TCP/IP has been used for many years in two country-wide networks, the ARPANET and MILNET. Recently, TCP/IP has become very popular with users of a variety of multi-user computer systems and engineering workstations. Most UNIX computers use TCP/IP over Ethernet as the main intercomputer networking technology. TCP/IP is also popular among PC users, particularly as a means of communication with large multi-user computers.

TELCO CONNECTOR— A 50-pin receptacle that plugs into the front of the hub, enabling cables from external devices to connect to the hub.

THICK ETHERNET—See 10BASE5

THIN ETHERNET—See 10BASE2

TRUNK CABLE—The coaxial cable used to distribute signals over long distances throughout a cable system.

UNMANAGED MODULE— A repeater that behaves as a “dumb” repeater in a department concentrator chassis (i.e., without a Master). It performs simple repeating tasks like packet retiming and regeneration, but is not managed.

UNSHIELDED TWISTED PAIR (UTP)—A cable used in 10BASE-T wiring that consists of at least two twisted pairs of 22 to 26 AWG wire. The pairs should have at least 3 twists per foot and have an impedance of 100 Ω. Level 3, Level 4 and Level 5 UTP cables fit these criteria.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Appendix E

Technical Support Fax Order

Name _____

Company _____

Address _____

City _____ **State/Province** _____ **Zip/PostalCode** _____

Country _____ **Phone** _____ **Fax** _____

Incident Summary

Model number of ATI product I am using _____

Firmware release number of ATI product _____

Other network software products I am using (e.g., network managers)

_____

Brief summary of problem _____

_____

_____

_____

Conditions (List the steps that led up to the problem.) _____

_____

_____

_____

_____

_____

_____

_____

Detailed description (Please use separate sheet)

Please also fax printouts of relevant files such as batch files and configuration files. Fax numbers can be found on page 79.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Appendix F

TurboStack™ Manual Feedback

Please tell us what additional information you would like to see discussed in the manual. If there are topics you would like information on that were not covered in the manual, please photocopy this page, answer the questions and fax or mail this form back to Allied Telesyn International (ATI). The mailing address and fax number are at the bottom of the page. Your comments are valuable when we plan future revisions of the manual.

On a scale of 1 to 10 (10 being most important), rate the importance of the following topics in this manual:

Hardware Installation	_____	Hub Management	_____
Connectivity	_____	MIB	_____
SNMP Software	_____	Troubleshooting	_____
IEEE 802.3 Quick Primer	_____	Reading the LEDs	_____
UTP Reference	_____	Telco Reference	_____
Software Downloading	_____		

I found the following the most valuable _____

_____

_____

I would like the following more developed _____

_____

_____

I would find the manual more useful if _____

_____

_____

Please fax or mail your feedback. Fax to 1-206-481-3790. Or mail to:
Allied Telesyn International Technical Publications Department
19015 North Creek Parkway Suite 200
Bothell, WA 98011 USA

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Appendix G
Where To Find Us

For Technical Support or Service		
Location	**Phone**	**Fax**
North America United States, Canada, Mexico, Central America, South America, Australia, New Zealand	1 (800) 428-4835	1 (206) 481-3790
France France, Belgium, Luxembourg, The Netherlands, Middle East, Africa	(+33) 1-69-28-16-17	(+33) 1-69-28-37-49
Germany Germany, Switzerland, Austria, Eastern Europe	(+01) 30-83-56-66	(+49) 30-435-70-650
Italy Italy, Spain, Portugal, Greece, Turkey, Israel	(+39) 2-38093-444	(+39) 2-38093-448
United Kingdom United Kingdom, Denmark, Norway, Sweden, Finland, Iceland	(+0) 800-20-40-40	(+44) 1-865-390-002
Japan	(+81) 3-3443-5640	(+81) 3-3443-2443
Asia Singapore, Taiwan, Thailand, Malaysia, Indonesia, Korea, Philippines, China, India	(+65) 383-2050	(+65) 383-2079
Hong Kong	(+852) 2-529-4111	(+852) 2 529-7661
Technical Bulletin Board Service	1 (206) 483-7979	
CompuServe	Go ALLIED	
Internet (ftp)	ftp://gateway.centre.com	
World Wide Web	http://www.alliedtelesyn.com	

For Information Regarding Allied Telesyn International Corp.	
Allied Telesyn International Corp. 19015 North Creek Parkway Suite 200 Bothell, WA 98011 TEL: 1 (206) 487-8880 FAX: 1 (206) 489-9191	**Allied Telesyn International Corp.** 950 Kifer Road Sunnyvale, CA 94086 Tel: 1 (800) 424-4284 (USA and Canada) Fax: 1 (408) 736-0100

For Sales Information

United States
Lilburn, GA
Tel: (404) 717-0290, Fax: (404) 717-0806
Salt Lake City, UT
Tel: (801) 350-9130, Fax: (801) 350-9051
Vienna, VA
Tel: (703) 506-0196, Fax: (703) 506-1986
Chicago, IL
Tel: (708) 406-8431, Fax: (708) 406-8462
Austin, TX
Tel: (512) 502-3087, Fax: (512) 794-9326
Dallas, TX
Tel: (214) 446-9873, Fax: (214) 446-8555
Reading, MA
Tel & Fax: (617) 944-3492
Los Angeles, CA
Tel: (310) 412-8684, Fax: (310) 412-8685
Costa Mesa, CA
Tel: (714) 432-6424, Fax: (714) 432-6546
San Diego, CA
Tel: (619) 279-3896, Fax: (619) 279-3897
Clearwater, FL
Tel: (813) 726-0022, Fax: (813) 726-0234
Tunnersville, NJ
Tel: (609) 438-1070, Fax: (609) 468--1201

Canada
Mississauga, Ontario
Tel: (905) 803-8626, Fax: (905) 279-0050
Richmond, British Columbia
Tel: (604) 244-0678, Fax: (604) 270-3644

Germany
Berlin
Tel: (+49) 30-435-9000, Fax: (+49) 30-435-70650
Freising
Tel: (+49) 8161-62-002, Fax: (+49) 8161-68-374
Lothar Bahn

The Netherlands
Schiphol
Tel: (+31) 20-654-0111, Fax: (+31) 20-654-0270

Italy
Milano
Tel: (+39) 2-38093-444, Fax: (+39) 2-38093-448

England
Abingdon, Oxon
Tel: (+1) 44-865-390001, Fax: (+1) 44-865-390002

France
Les Ulis
Tel: (+33) 1-69-28-16-17, Fax: (+33) 1-69-28-37-49

Hong Kong
Kowloon
Tel: (+852) 2-393-0101, Fax: (+852) 2-397-7979
Wanchai
Tel: (+852) 2-529-4111, Fax: (+852) 2-529-7661

Singapore
Tel: (+65) 383-3832, Fax: (+65) 383-3830

Japan
Shinagawa-ku, Tokyo
Tel: (+81) 3-3443-5640, Fax: (+81) 3-3443-2443
Yodogawa-ku, Osaka
Tel: (+81) 6-391-6310, Fax: (+81) 6-391-6325
Fujisawa-shi, Kanagawa
Tel: (+81) 466-88-8510, Fax: (+81) 466-88-8515
Machida-shi, Tokyo
Tel: (+81) 427-21-8141, Fax: (+81) 427-21-8848
Nagoya-shi, Aichi
Tel: (+81) 52-223-3791, Fax: (+81) 52-223-3736

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Appendix H
Index

A
accessories 64
adapters
  AT-ADAPT-2 64, 69
  harmonica 71
  harmonica-style 64
  octopus 64
amber
  collision 42, 45, 51, 56
  partition 41, 45, 51, 56
application-specific integrated circuit (ASIC) 2
appliqué port 2
ASYNC ASCII terminal port 3
attachment unit interface (AUI) 2, 69
AT-TS08
  on line 35
  receive 35
AUI 6
AUI drop cables 66

B
baseband coaxial system 69
bit rate 70
bit time 70

C
cable color 62
Cable colors 62, 63
cabling
  10BASE2 2, 3, 16, 34, 65, 66, 69, 70
  10BASE5 2, 16, 65, 66, 69
  10BASE-FL 2, 3, 4, 16, 27, 37, 66, 69
  10BASE-T 2, 3, 4, 16, 26, 43, 44, 45, 48, 49, 51, 54, 55, 56, 57, 58, 59, 64, 65, 69, 70
  crossover 54, 59, 65, 70
  data-grade 26
  fiber optic length 40
  FOIRL 71
  impedance 69, 71
  point-to-point 65
  silver satin 26
  straight-through 54, 58, 65, 73
  UTP 43, 45, 47, 48, 51, 53, 57, 59, 65
  voice-grade 26
carrier sense 70
carrier sense multiple access with collision detection (CSMA/CD) 4, 70
chassis
  department concentrator 1, 2, 3, 4, 11, 17
  desktop 4
  options 7
  rackmount 1, 4
  segmented backplane 8
  standard backplane 7
coax segment 70
coaxial cable 70
coaxial cable segment 70
compatibility interface 70
compliance
  IEEE 802.3 1, 2, 4, 66, 67, 69, 70
configuration
  standalone 73
connectivity
  AT-3608 33
  AT-TS12T 43
  AT-TS12TR 47
  AT-TS24T 49
  AT-TS24TR 53
connectors
  50-pin Telco 64
  50-pin telco 4, 44, 50, 61, 69, 71
  AUI 16
  bayonet nut couple (BNC) 3
  bayonet nut couple connector 70
  BNC 16, 33
  BNC-T 34
  DIX 71
  D-sub 70
  N-series 72
  RJ21 3, 16, 49
  RJ45 3, 4, 16, 47, 53, 54, 58, 69, 71, 73
  RS232 9

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

SC 16, 40
SM 16, 40, 41
ST 16, 40
straight tip (ST) 3, 4, 27, 37, 73
sub minature assembly (SMA) 73
sub miniature assembly (SMA) 3, 4, 27, 37
subscriber channel (SC) 3, 4, 27, 37, 73
telco 50-pin 3, 43, 49
UTP 49, 56

D
data communication equipment (DCE) 70
data terminal equipment (DTE) 69, 70
department concentrator 6, 69, 71
diagnostics
LEDs 3

E
Ethernet 69

F
fiber optic 66, 69
firmware
AT-S10 6
four repeater rule 65

G
glossary 69
green
link 41, 45, 48, 51, 56
receive 41, 45, 48, 51, 56

H
heartbeat 26
hot swap 9
hot swapping 14, 71
hub 1, 26, 62
hub MIB 1
hub/repeater 71
hybrid cable 40

I
IEEE 802.3
propagation specification 67
indicator
collision 70
indicators 35, 41, 42, 45, 48, 51, 56
AT-TS08 35
fault 25
heartbeat 71
hub status 24
link 12, 15, 26
link test 72
master 25
no link 45, 48, 51, 56
port 24, 41, 44, 48, 50, 55
power 12, 14, 25
receive 12, 15
status 24
installation
hardware 11
power 11
ventilation 11
interrepeater bus connector 24

J
jabber lock-up 71
jam 71
jitter 71

L
LAN 70
LEDs
diagnostic 3
link segment 71

M
mac prom 10
manageable hub/repeater 1
managed module 72
management
ip addresses 9
network 9
network, planning 9
SNMP 3
tcp/ip 9
telnet 9
management agent 5, 6, 72, 73
Omega 3
omega 17
management information base (MIB) 1
MAU/transceiver 72
MDI/MDI-X 72
MDI/MDI-X Switch 54
MDI-X 54
media access control (MAC) 10
medium attachment unit (MAU) 58, 72
medium dependent interface (MDI) 54, 72
module 72
AT-TS12T 61
backup 69
master 5, 6, 72
slave 5, 6, 73
modules
AT-210T 18
AT-210TS 18
AT-3600 6, 16
AT-MX10 18
AT-MX10S 18
AT-MX20T 18
AT-MX40F/ST 18
AT-MX50F/SM 18
AT-MX55F/SC 18
AT-TS06/SC 27
AT-TS06F/SC 3
AT-TS06F/SM 3, 27
AT-TS06F/ST 3, 27
AT-TS08 3, 12, 33
AT-TS12F/SC 3
AT-TS12F/SM 3
AT-TS12F/ST 3
AT-TS12FS/SC 4

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

AT-TS12FS/SM 1
AT-TS12FS/SMA 4
AT-TS12FS/ST 4
AT-TS12T 3, 43, 44, 64
AT-TS12TR 3, 47, 48
AT-TS24 44, 61
AT-TS24T 3, 49, 50, 64
AT-TS24TR 3, 53, 54, 55
AT-TS24TRS 1, 4
AT-TS24TS 1, 4
AT-TS90TR 6
AT-TS95T 6
AT-TSA1 18
AT-TSA2 18
AT-TSA3 18
AT-TSA5 18
AT-TSA8 18
AT-TSA9 18
backup 6, 25
functions 6
hot swapping 3
master 6, 12, 25
slave 1
slaves 6

N
network interface controller (NIC) 58
no light 42

O
off
0 36
on
1 36

P
patch panel 64, 72
polarity correction 72
ports
appliqué 2
AUI 17
network 16
RS232 terminal 16
station 17
propagation delay 66, 73
punch-down block 62, 73

R
receiving
receiving pin (RD) 66
repeater 5, 6, 69, 72, 73
repeater software
upgrading from cassette 3
upgrading from download 3
return material authorization (RMA) 26
RJ45 connectors 3
rubber feet 13

S
signal quality error (SQE) 73
silver satin 64
simple network management protocol (SNMP) 1, 73
SQE test 26, 73

T
TCP/IP protocols 74
telco connector 74
termination 66
terminator switch 36
transmitting
transmitting pin (TD) 66

U
unmanaged module 74
unshielded twisted pair (UTP) 2, 74
UTP 26, 69
UTP specification 65

W
wiring 2, 3, 4, 16, 26, 27, 34, 37, 40, 43, 44, 45, 47, 48, 49, 51, 53, 54, 55, 56, 57, 58, 59, 64, 65, 66, 69, 70, 71, 73
10BASE2 termination 35
house wiring 71
hub-to-hub 71
hub-to-MAU 71
MAU-to-MAU UTP, hub-to-hub 72
thick Ethernet 74
thin Ethernet 74
trunk cable 74

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

AT-TS12TR Faceplate 2
7-Slot Chassis with
Segmented
Backplane 5
8-slot Chassis with Standard Backplane 7
Segmented
Backplane (detail) 8
Location of MAC
Address Label 10
Removing
Interrepeater Bus Dust Cover 13
Removing Rubber Feet from Module 13
Reinstalling Screws 14
Installing a Module in a Chassis 15
RS232 Terminal Port 16
Network Port
Appliqués 17
AT-TS06F/SC
Faceplate 19
AUI Appliqué
Assembly 20
AUI Appliqué 20
AUI Appliqué
Connector Plate 21
AUI Connector and Ribbon Cable
Assembly 21
Appliqué
Installation 22
AUI Connector
Interface 22
Module Faceplate
Interface 23
TurboStack Hub Back Panel 24
AT-TS12F/SC Hub LED Displays 25
AT-TS06F/ST
Faceplate 28
AT-TS06F/SC
Faceplate 28
AT-TS06F/SM
Faceplate 29
ST Connector for
Fiber Optic Cabling 30
SC Connector for
Fiber Optic Cabling 30
SM Connector for
Fiber Optic Cabling 31
AT-TS06F/SC Port Activity LEDs 31

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

AT-TS08 Faceplate 33
AT-TS08 Cascade connection 34
BNC-T at End of 10BASE2 Segment 35
BNC Connector at End of Segment with Internal Termination 35
AT-TS08 Port
Indicators 36
AT-TS12F/ST
Faceplate 38
AT-TS12F/SC
Faceplate 38
AT-TS12F/SM
Faceplate 39
ST Connector for Fiber Optic Cabling 40
SC Connector for Fiber Optic Cabling 40
SM Connector for Fiber Optic Cabling 41
AT-TS12F Port Activity LED symbols 41
AT-TS12T Faceplate 43
50-Pin Telco
Receptacle 44
AT-TS12T Port LEDs 44
AT-TS12TR
Faceplate 47
RJ45 Connector 48
AT-TS12TR Port LEDs 48
AT-TS24T Faceplate 49
50-Pin Telco Receptacle 50
AT-TS24T Port LEDs 50
AT-TS24TR
Faceplate 53
RJ45 Connector 54
MDI/MDI-X Switch 55
AT-TS24TR Port LEDs 55
RJ45 Cable 58
Hub-to-MAU Wiring (A) Usable and (B) Unusable 58
Hub-to-Hub or MAU-to-MAU Wiring 59
50-Pin Telco Receptacle 61
AT-ADAPT-2 Telco-to-RJ45 Harmonica Adapter for AT-TS12T 64

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

TurboStack Hubs with Management 3
TurboStack Hubs without Management 4
ATI Network Port Appliqués 18
ATI Micro Transceivers 18
AT-TS06F Hubs with Management 27
AT-TS12F Series Hubs with Management 37
Usable and Unusable Twisted Pair Cable 57
50-Pin Telco Pin-Out 62

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Artisan Technology Group

Artisan Technology Group is your source for quality new and certified-used/pre-owned equipment

- FAST SHIPPING AND DELIVERY
- TENS OF THOUSANDS OF IN-STOCK ITEMS
- EQUIPMENT DEMOS
- HUNDREDS OF MANUFACTURERS SUPPORTED
- LEASING/MONTHLY RENTALS
- ITAR CERTIFIED SECURE ASSET SOLUTIONS

SERVICE CENTER REPAIRS
Experienced engineers and technicians on staff at our full-service, in-house repair center

WE BUY USED EQUIPMENT
Sell your excess, underutilized, and idle used equipment
We also offer credit for buy-backs and trade-ins
www.artisantg.com/WeBuyEquipment ↗

InstraView™ **REMOTE INSPECTION**
Remotely inspect equipment before purchasing with our interactive website at ***www.instraview.com*** ↗

LOOKING FOR MORE INFORMATION?
Visit us on the web at ***www.artisantg.com*** ↗ for more information on price quotations, drivers, technical specifications, manuals, and documentation

Contact us: (888) 88-SOURCE | sales@artisantg.com | www.artisantg.com